The Foundry

VOLUME 65 • NUMBER 4

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London . . . . . Caxton House, Westminster, S.W.1

THE FOUNDRY is published monthly on the 15th of each month by The Penton Publishing Co., Penton Building, 1213 West Third street, Cleveland, Ohio. JOHN A. PENTON, Chairman, Board of Directors; C. J. STARK, President and Treasurer; E. L. SHANER, J. R. DAWLEY and G. O. HAYS, Vice-Presidents; F. G. STEINEBACH, Secretary.

Subscription: United States and Mexico, $2.00 a year; Canada, $3.00 a year; Great Britain and other Foreign Countries, $4.00 a year; single copies, 25 cents. Copies published three months or more previous to date of current issue, 50 cents each. Entered as second class matter at post-office at Cleveland under the act of March 3, 1879.

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Member: Audit Bureau of Circulations, Associated Business Papers, National Publishers Association.

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It's Another

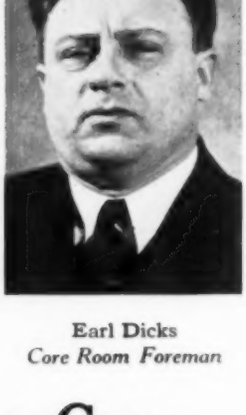
NASH

the 1937 LaFayette "400"

FIFTEEN YEARS OF

Louis Rasmussen
Foundry Superintendent and Staff in charge of
FOUNDRY DEPARTMENT

"IN fifteen years of continuous use of Linoil we have yet to find an unsatisfactory shipment nor one that did not answer to our laboratory's highest standards. Its unusual uniformity has made a bulls-eye with us and it is no bull when I say that Linoil goes a long way toward making contented foundrymen more contented and those in trouble carefree. It's 'Oil Right' and 'Right Oil'." LOUIS RASMUSSEN



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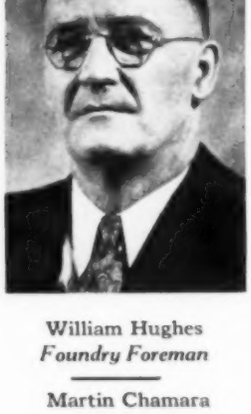

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You Can't Go Wrong With LINOIL

Nash-Kelvinator Corp.
NASH MOTORS DIVISION
Kenosha, Wisconsin

There will be a Fine Exhibition of Nash Motor and Other Cores in our Booth at the Convention

THE WERNER G.

THE FOUNDRY

For April

Convention Points Way In a New Era

ONCE again the American Foundrymen's association exercises one of the principal functions set forth in the by-laws by holding a convention and exhibition. "To promote the technical interests of the foundry industry and the welfare of all persons therein, or connected therewith." An excellent program of papers prepared by leaders in advanced foundry thought, and a comprehensive foundry show made possible by over 200 manufacturers of foundry equipment and supplies, present a significant opportunity to all classes of foundrymen.

Foundries today are operating at the highest rate in years, and prospects for the immediate future appear bright. In meeting production problems of today, it may be difficult for some to catch a vision of the difficulties which must be met and overcome tomorrow. Managements may consider it impossible to send all key men to Milwaukee for at least a portion of Foundry Week when they may be needed badly every day in the plant. Nevertheless, such reasoning is fallacious.

The foundry industry is faced with a wide variety of problems which can be solved only through a greater interchange of knowledge and experience. What new materials are available to speed production and increase the value of castings produced? What should be done to further apprentice training? What has been the experience in certain localities in furthering safety and hygiene in the foundry industry and how can this experience be adapted to the industry as a whole? What progress has been made in furthering uniform foundry costs? These and hundreds of other questions of equal importance will be answered during the convention.

If the individual foundry is to keep pace with the progress of the industry, it should have ample representation at Milwaukee, May 3 to 7. Undoubtedly the 1937 convention will point the way in a new industrial era.

Publicity and Apprentices

CONGRATULATIONS to the groups in several cities sponsoring contests to determine entrants in the apprentice competition to be held during the Milwaukee convention. Local publicity being given these events will go a long way in interesting more boys in the possibilities of foundry apprenticeship.

Also congratulations to the Apprenticeship Training committee for adding brass molding to the contest. Another year perhaps malleable molding may be added.

Are With Us Always

WHILE time marches on and civilization continues to change, not all situations are new which trouble industry today. Perusal of the history of the foundry industry as recorded in the pages of THE FOUNDRY, since the beginning of the century, reveals many striking parallelisms with present day problems. Knowledge of the resourcefulness of foundry leaders ten, twenty and thirty years ago should give courage to the present generation.

The point may be well illustrated by considering briefly the background of A.F.A. conventions held in Milwaukee in 1903, 1918 and 1924. In the opening address of the 1903 convention, the president stated:

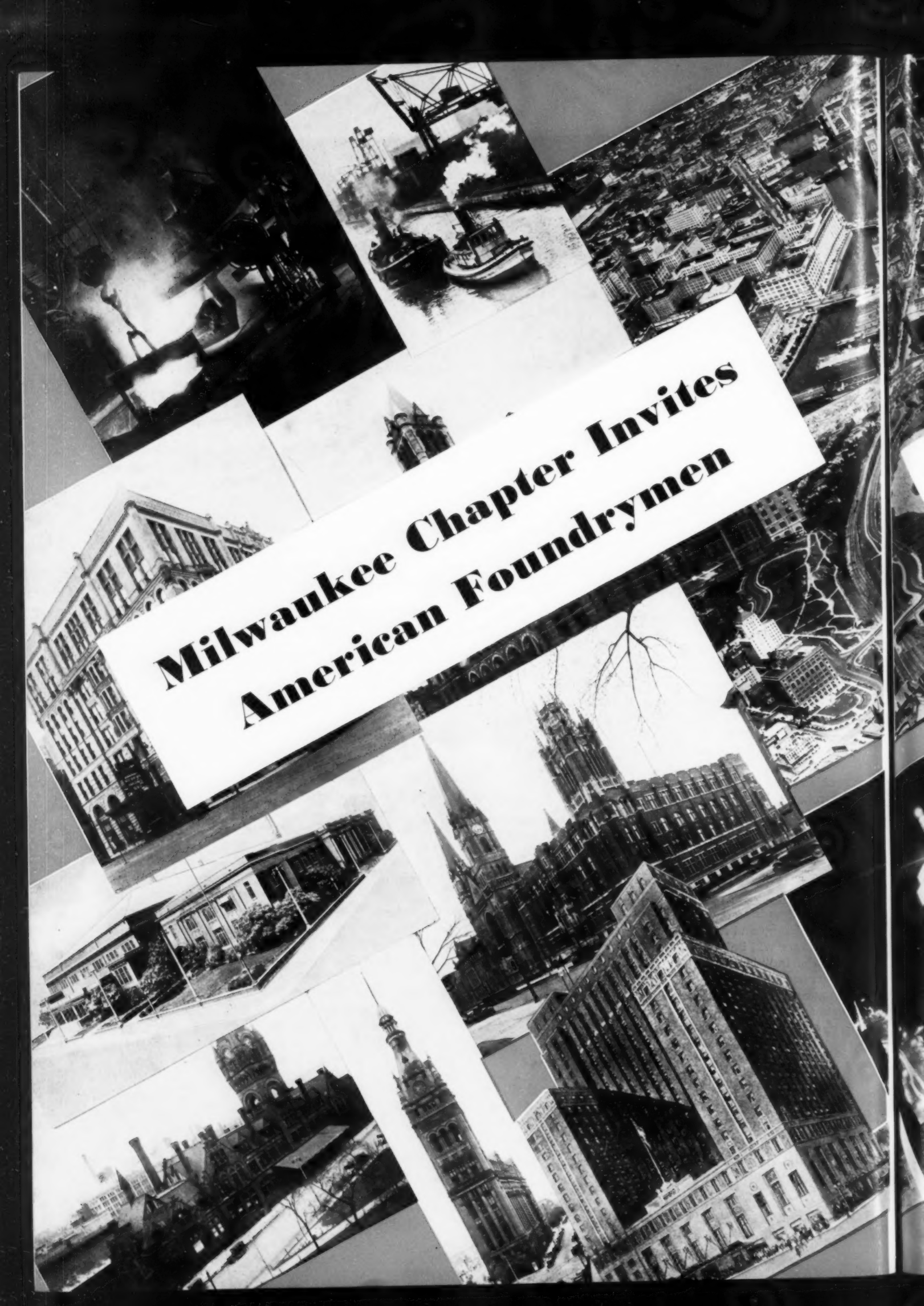
> We have passed through the difficulties of a rapidly rising market. I hope we shall not experience the trials of a rapidly falling market, which is, in my belief, even more difficult for the manufacturer. . . . We cannot expect present methods of manufacture will long continue, neither can we hope that the present manner of dealing with labor will remain satisfactory during the next ten or twenty years . . . .The health and comfort of the workmen in the shop is a matter so old it is hardly necessary to refer to it . . . . We must furnish the apprentice the means to acquire the information that is to be the foundation of his life work.

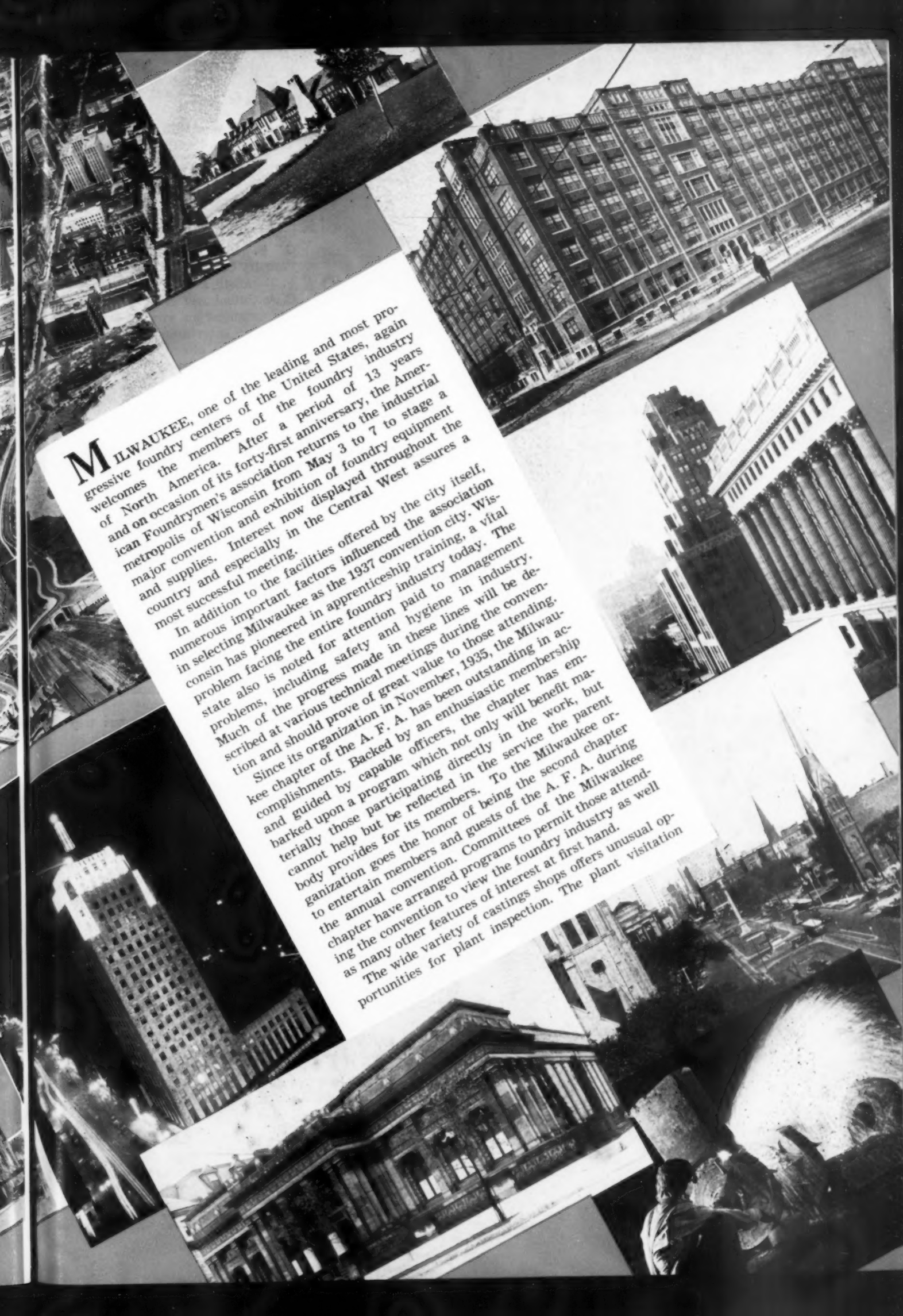
The second Milwaukee convention, held the first week of October in 1918, was concerned entirely with the question "How can we contribute more effectively to the winning of the war?" Manpower represented the biggest foundry problem; prices were at record heights; and a shortage of materials was acute.

In 1924, industry had just emerged from a depression. At Milwaukee the dominant topic was "Meeting the new competition." The industry was searching for methods of producing better castings at a lower cost to meet the encroachment of other forms of fabrication. Foundry operations had been increasing, prices had been rising, and due to restrictions in immigration, the need for greater attention to apprentice training was stressed.

Surely the men behind President Arthur W. Walker in 1903, President Benjamin D. Fuller in 1918, and President Gulliam H. Clamer in 1924 had much in common with President James L. Wick Jr. and the entire foundry industry today, in the present year 1937.

Frank G. Steinebach
Editor


Milwaukee Chapter Invites
American Foundrymen



MILWAUKEE, one of the leading and most progressive foundry centers of the United States, again welcomes the members of the foundry industry of North America. After a period of 13 years and on occasion of its forty-first anniversary, the American Foundrymen's association returns to the industrial metropolis of Wisconsin from May 3 to 7 to stage a major convention and exhibition of foundry equipment and supplies. Interest now displayed throughout the country and especially in the Central West assures a most successful meeting.

In addition to the facilities offered by the city itself, numerous important factors influenced the association in selecting Milwaukee as the 1937 convention city. Wisconsin has pioneered in apprenticeship training, a vital problem facing the entire foundry industry today. The state also is noted for attention paid to management problems, including safety and hygiene in industry. Much of the progress made in these lines will be described at various technical meetings during the convention and should prove of great value to those attending.

Since its organization in November, 1935, the Milwaukee chapter of the A. F. A. has been outstanding in accomplishments. Backed by an enthusiastic membership and guided by capable officers, the chapter has embarked upon a program which not only will benefit materially those participating directly in the work, but cannot help but be reflected in the service the parent body provides for its members. To the Milwaukee organization goes the honor of being the second chapter to entertain members and guests of the A. F. A. during the annual convention. Committees of the Milwaukee chapter have arranged programs to permit those attending the convention to view the foundry industry as well as many other features of interest at first hand.

The wide variety of castings shops offers unusual opportunities for plant inspection. The plant visitation

committee with John T. Brown, Chain Belt Co., as chairman and H. P. Kreulen, Spring City Foundry Co., vice chairman, has arranged for one organized plant visitation program on Friday, May 7. At 11 a. m. busses will leave for Waukesha to visit the foundries in that district and at 1 p. m. an organized trip will be made to the plant of the Falk Corp.

In addition, the following plants will be open for inspection at various times during the convention week. Detailed schedule of visitations is shown on page 108 of this issue of THE FOUNDRY: Badger Malleable & Mfg. Co., Belle City Malleable Iron Co., Bucyrus-Erie Co., Federal Malleable Co., Koehring Co., Kearney Trecker Co., Liberty Foundry Co., Loeffelholz Co., Maynard Steel Casting Co., Milwaukee Malleable & Gray Iron Co., Nordberg Mfg. Co., Rundle Mfg. Co., Sivyer Steel Casting Co., Smith Steel Casting Co., Universal Foundry Co., Vilter Mfg. Co., Wisconsin Appleton Co., and the Zenith Foundry Co. The committee will have a booth in the Milwaukee auditorium where complete information on the plants to be visited and the time for such visit will be provided.

Prepare for Stag Dinner

After the exceptionally successful stag dinner at the Detroit convention last year, foundrymen planning to attend the present convention are looking forward to a similar affair to be staged at the Hotel Schroeder in Milwaukee on Tuesday, May 4. The dinner will be held under the joint auspices of the Foundry Equipment Manufacturers association, the American Foundrymen's association, and the Milwaukee Chapter of the A. F. A.

The Milwaukee committee planning the entertainment for the stag dinner is under the direction of A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis., as chairman and Harry R. Donald, Interstate Supply & Equipment Co., as vice chairman. The committee has arranged for special entertainment and a floor show. In addition 10 door prizes valued at approximately $500 will be given to the holders of lucky tickets. Advance reservations may be made with the Foundry Equipment Manufacturers association, the American Foundrymen's association or the Milwaukee committee.

The ladies entertainment committee of the Milwaukee chapter, under the general chairmanship of O. F. Patzke, Milwaukee Steel Foundry Co., and with Mrs. William F. Bornfleth as chairman and Mrs. C. A. Gutenkunst as vice chairman, has arranged an exceptionally attractive entertainment program for the ladies attending the convention. The committee is extending a cordial invitation to the ladies to come to Milwaukee for convention week. Ladies' registration headquarters will be located in the Ladies' lounge off the main lobby of the Hotel Schroeder from Monday through to Thursday.

Ladies To Be Feted

On Monday afternoon, May 3, a reception and tea will be held in the Ladies' lounge, Hotel Schroeder. A tea and style show starting at 4 p. m. Tuesday afternoon will be held at the Boston store, Fourth and Wisconsin avenues. A theatre party is planned for Tuesday evening. Wednesday will be devoted to sightseeing trips through various parts of Milwaukee and the surrounding territory. A bus trip through the inland lakes district of Milwaukee will start at 9 a. m. Busses will depart at 11 a. m. for a sightseeing trip through the Milwaukee Park system. Lunch will be served at 1 p. m. at the plant of the Schlitz Brewing Co. through the courtesy of that company, and an opportunity given to inspect the plant.

The committee also has arranged a lunch and bridge for the visiting ladies Thursday noon at the Wisconsin club, Eleventh and Wisconsin avenues. The annual dinner which will be held Thursday evening will be followed by a reception and dance under the auspices of the Milwaukee chapter. Information on the ladies program, points of interest in Milwaukee, and shopping centers, will be available at the Ladies' Registration headquarters throughout the week.

The golf committee, with E. L. Roth, Motor Castings Co. as chairman and Walter Underwood, Hickman, Wil- (*Please turn to page* 146)

Schedule of Convention Activities

Monday, May 3

Plant Visitation, Morning
Registration at Auditorium
Exhibits open, 1 p.m.
Open Session, 2 p.m.
Shop Operation Course, 3 p.m. Cupola Operation and Construction
Dinner Engineering Instructors, 6:30 p.m.

Tuesday, May 4

Shop Operation Course, 8:30 a.m.
Gray Cast Iron, 10 a.m.
Steel Castings, 10 a.m.
Job Evaluation, 10 a.m.
Luncheon, Gray Iron Division, 12:30 p.m.
Gray Cast Iron, 2 p.m.
Steel Foundry, 2 p.m.
Malleable Cast Iron, 2 p.m.
Shop Operation Course, 4 p.m. Cupola Operation
Stag Dinner and Entertainment, 7 p.m. Under joint auspices of the Foundry Equipment Manufacturers' association, A.F.A., and the Milwaukee Chapter.

Wednesday, May 5

Apprentice Training, 10 a.m.
Sand Research, 10 a.m.
Malleable Founding, 10 a.m.
Luncheon and Round Table Discussion, Malleable Division, 12:30 p.m.
Luncheon and Round Table Discusion, Steel Division, 12:30 p.m.
Foundry Costs, 2 p.m.
Gray Cast Iron, 2 p.m.
Shop Operation Course, 4 p.m. Core Making
Safety Methods and Good Housekeeping, 7:30 p.m.

Thursday, May 6

Steel Founding, 10 a.m.
Nonferrous Foundry Practice, 10 a.m.
Occupational Disease Laws, 10 a.m.
Luncheon and Round Table Discussion, Nonferrous Division, 12:30 p.m.
Foreman and Apprentice Training, 2 p.m.
Refractories, 2 p.m.
Annual Business Meeting, 4 p.m.
Shop Operation Course, 4 p.m. Gray Iron Foundry Practice
Annual Dinner, 7 p.m.

Friday, May 7

Gray Cast Iron, 10 a.m.
Nonferrous Practice, 10 a.m.
Exhibit Closes, 1 p.m.
Plant Visitation, Afternoon

Milwaukee Committees For A. F. A. Convention

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Cutler-Hammer Inc.

General Vice Chairman
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William F. Bornfleth

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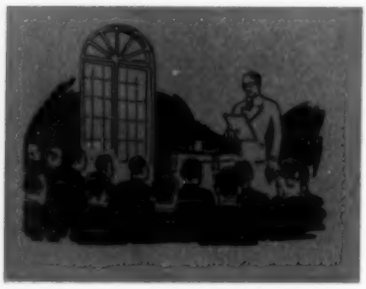


Tentative Program
Milwaukee

Monday, May 3

Morning—*Plant Visitation*

1:00 p.m.—*Opening of Exhibition*

2:00 p.m.—*Formal Opening Session—Forty-first Annual Convention*

Presiding—James L. Wick Jr., president.

Chairman—P. T. Bancroft, Moline, Ill.
Cupola Construction and Operation, Discussion Leader—D. J. Reese, International Nickel Co., Bayonne, N. J.
Capacity of Cupola Basins, by J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala.

3:00 p.m.—*Shop Operation Course—Cupola Operation and Construction*

6:30 p.m.—*Dinner Meeting—Engineering School Instructors*

Tuesday, May 4

8:30 a.m.—*Shop Operation Course—Sand Control*

Chairman—R. K. Akin, Chicago Malleable Castings Co., Chicago.
Synthetic Sands, Discussion Leader—H. A. Deane, Deere & Co., Moline, Ill.

10:00 a.m.—*Gray Cast Iron*

Chairman—Hyman Bornstein, Deere & Co., Moline, Ill.; vice chairman, H. C. Griggs, Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Ferrite, Its Occurrence and Control in Gray Cast Iron, by Richard Bancroft, Perfect Circle Co., New Castle, Ind., and A. H. Dierker, Ohio State university, Columbus, O.
Effect of Coke Size on Cupola Melting, by J. A. Bowers and James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.
Pressure Castings, by H. H. Judson, Goulds Pumps Inc., Seneca Falls, N. Y.
Report of Committee on Fluidity Testing, by W. H. Spencer, Sealed Power Corp., Muskegon, Mich.

10:00 a.m.—*Steel Castings*

Chairman—H. D. Phillips, Dodge Steel Co., Philadelphia.
Designing for Steel Castings, by R. A. Bull, Chicago.
Report of Committee on Methods for Producing Steel for Castings, by F. A. Melmoth, Detroit Steel Castings Co., Detroit.
Specifications for Steel Castings, by E. W. Campion, Bonney-Floyd Co., Columbus, O.
Studies on Solidification and Contraction in Steel Castings—V, by C. W. Briggs and R. E. Gezelius, Naval Research laboratory, Washington.
Report of Committee on Coupon Tests, by J. M. Sampson, General Electric Co., Schenectady, N. Y.

10:00 a.m.—*Management—Job Evaluation*

Chairman—Henry S. Washburn, Plainfield Casting Co., Plainfield, Conn.
Job Evaluation for Rate Setting, by Bertram Miller, General Electric Co., Erie, Pa.
Time-Motion Study and Job Standardization, by H. C. Robson, Link-Belt Co., Chicago.

12:30 p.m.—*Gray Iron Division Luncheon*

2:00 p.m.—*Gray Cast Iron*

Chairman—J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.; vice chairman, Garnet P. Phillips, International Harvester Co., Chicago.
Graphitization and Inclusions, by John W. Bolton, Lunkenheimer Co., Cincinnati.
Hardenability of Cast Iron, by D. W. Murphy and W. P. Wood, University of Michigan, Ann Arbor, Mich.
Cast Iron for Nitriding, by J. E. Hurst, Staffs, England.

2:00 p.m.—*Steel*

Chairman—R. A. Bull, Chicago; co-chairman, V. T. Malcolm, Chapman Valve Mfg. Co., Indian Orchard, Mass.
Radiography and Steel Castings—Committee report.
Developments in Heat Treatment of Steel Castings—Committee report.

2:00 p.m.—*Malleable Cast Iron*

Chairman—P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.; co-chairman, E. A. Gullberg, Deere & Co., Moline, Ill.
Shrinkage in Malleable Cast Iron—Committee report.
Physical Tests of Heat Treated and Fully Annealed Malleable Irons, by R. Schneidewind and A. W. White, University of Michigan, Ann Arbor, Mich.

4:00 p.m.—*Shop Operation Course—Cupola Operation*

Chairman—Kenneth H. Priestley, Eaton-Erb Foundry Co., Vassar, Mich.
Cupola Operation and Carbon Control, Discussion Leader—Fred J. Walls International Nickel Co., New York.

7:00 p.m.—*Stag Dinner and Entertainment—*

Under Auspices of A.F.A.-F.E.M.A.-Milwaukee Chapter of A.F.A.

Wednesday, May 5

10:00 a.m.—*Management—Apprentice Training*

Chairman—John H. Ploehn, French & Hecht, Inc., Davenport, Iowa; vice chairmen—W. C. Van Cleaf, and W. E. Watson, Allis-Chalmers Mfg. Co., Milwaukee.
Apprentice Training for Foundries, by Macon P. Miller, Lynchburg Foundry Co., Lynchburg, Va.
Apprentice Training—Plan of Caterpillar Tractor Co., by K. P. Crowell, Caterpillar Tractor Co., Peoria, Ill.
Apprentice Training as Viewed by a Graduate Apprentice, by Carl F. Haertel, Falk Corp., Milwaukee.

10:00 a.m.—*Sand Research*

Chairman—H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y.
Durability of Foundry Sands, by C. E. Schubert, University of Illinois, Urbana, Ill.
Control of Core Hardness, by Harry W. Dietert, H. W. Dietert Co., Detroit.
Report of Committee on Sand Research.

10:00 a.m.—*Malleable Founding*

Chairman—Lester N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala.; co-chairman—D. Porter Spencer, Belle City Malleable Iron Co., Racine, Wis.
Selection of Annealing Cycles and Furnaces for Annealing Malleable Cast Iron, by A. F. Landa, Central Scientific Institute for Machine Production, Moscow, U.S.S.R.
Sand Control in a Malleable Foundry, by E. Zirzow, National Malleable & Steel Castings Co., Cleveland.
Developments in Melting Malleable Cast Iron, by W. R. Bean, Whiting Corp., Harvey, Ill.

12:30 p.m.—*Malleable Division Luncheon and Round Table Discussion*

Chairman—E. P. Meyer, Chain Belt Co., Milwaukee.
Newer Annealing Methods.

Of Activities For Convention

12:30 p.m.—*Steel Division Luncheon and Round Table Discussion*

Chairman—R. C. Woodward, Bucyrus-Erie Co., South Milwaukee, Wis., vice chairman—A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn.
Survey of Report of Iron & Steel Institute Committee on Steel Castings Research, by C. W. Briggs, Naval Research laboratory, Washington.

2:00 p.m.—*Management—Foundry Costs*

Chairman—Sam Tour, Lucius Pitkin Inc., New York.
Malleable Foundry Cost Methods, by R. E. Belt, Malleable Founders' society, Cleveland.
Steel Foundry Cost Methods.
Gray Iron Foundry Cost Methods, by W. J. Grede, Liberty Foundry Co., Milwaukee.
Nonferrous Foundry Cost Methods, by James L. Wick Jr., Falcon Bronze Co., Youngstown, O.

2:00 p.m.—*Gray Cast Iron*

Chairman—S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago; co-chairman—Fred J. Walls, International Nickel Co., New York.
Wear Testing, by P. S. Lane, American Hammered Piston Ring division, Koppers Co., Baltimore.
Microstructure and Physical Properties of Cast Iron, by A. L. Boegehold, General Motors Corp., and Victor A. Crosby, Climax-Molybdenum Co., Detroit.
An Improved Method of Making Test Bars, by A. I. Krynitsky and C. M. Saeger Jr., U. S. Bureau of Standards, Washington.

4:00 p.m.—*Shop Operation Course—Core Making*

Chairman—Elmer J. Carmody, National Superior Co., Springfield, O.
Core Making, Discussion Leader—H. L. Campbell, American Hoist & Derrick Co., St. Paul, Minn.

7:30 p.m.—*Management—Safety Methods and Good Housekeeping*

Chairman—Voyta Wrabetz, Industrial Commission of Wisconsin, Madison, Wis.
Foot and Leg Protection, by M. Walter Dundore, Beloit Iron Works, Beloit, Wis.
Head and Eye Protection, by J. Holzbog, Chain Belt Co., Milwaukee.
A Consideration of Human Silicosis, by Dr. Norbert Enzer, Milwaukee.
Good Housekeeping, by Dr. E. G. Meiter, Employers Mutual Liability Insurance Co., Milwaukee.
Safety as Affected by Maintenance, by James Thomson, Continental Roll & Steel Foundry, East Chicago, Ind.

Thursday, May 6

10:00 a.m.—*Steel Founding*

Chairman—John Howe Hall, Taylor Wharton Iron & Steel Co., High Bridge, N. J.
Cement as a Bonding Material, by C. A. Menzel, Portland Cement Association, Chicago.
Sand Control as Related to Steel Casting Production, by Charles Fuerst, Falk Corp., Milwaukee.
Report of Committee on Steel Foundry Sands, by R. E. Aptekar, American Brake Shoe & Foundry Co., New York.

10:00 a.m.—*Nonferrous Foundry Practice*

Chairman—H. M. St. John, Detroit Lubricator Co., Detroit; vice chairman—William Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Practical Applications of Sand Control in Nonferrous Foundries, by A. C. Arbogast, Northern Indiana Brass Co., Elkhart, Ind.
Some Fundamentals in Nonferrous Sand Control, by G. K. Eggleston, Detroit Lubricator Co., Detroit.
A Study of Nonferrous Sands, by Harry W. Dietert, H. W. Dietert Co., Detroit. Detroit Division Business Meeting.

10:00 a.m.—*Management — Occupational Disease Laws*

Chairman—Dan M. Avey, American Foundrymen's association, Chicago.
Occupational Disease Laws, by O. E. Mount, American Steel Foundries, Chicago.
Industrial Codes and Their Applications, by James R. Allan, International Harvester Co., Chicago.

12:30 p.m.—*Nonferrous Division Luncheon and Round Table Discussion*

Chairman—C. V. Nass, Fairbanks-Morse Co., Beloit, Wis.

2:00 p.m.—*Management — Foreman and Apprentice Training*

Chairman—V. J. Hydar, Falk Corp., Milwaukee; vice chairman—Stanley M. Brah, International Correspondence Schools, Chicago.
Foreman Training, by A. D. Lynch, Hammond Brass Works, Hammond, Ind.
Conference on Apprentice Training—Discussion Leaders—H. A. Frommelt and Stewart Scrimshaw, Marquette university, Milwaukee.

2:00 p.m.—*Refractories*

Chairman—John Lowe, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.
Insulating Refractory Brick, Their Properties and Applications, by A. V. Leun, Bethlehem Steel Co., Bethlehem, Pa.
Insulating Refractories, by Dr. G. A. Bole, Ohio State university, Columbus, O.
Use of Firestone for Cupola Linings, by Harry Rayner, Chrysler Corp., Detroit.
Report of Work of Joint Committee on Foundry Refractories, by Elmer J. Carmody, National Superior Co., Springfield, O.

4:00 p.m.—*Annual Business Meeting*

Presiding—President James L. Wick Jr.

4:00 p.m.—*Shop Operation Course—Foundry Practice*

Chairman—Leslie G. Korte, Atlas Foundry Co., Detroit.
Gating and Risering, Discussion Leader—Rex Jennings, Deere & Co., Waterloo, Iowa.

7:00 p.m.—*A.F.A. Annual Dinner*

Friday, May 7

10:00 a.m.—*Gray Cast Iron*

Chairman—John W. Bolton, Lunkenheimer Co., Cincinnati; vice chairman—H. H. Judson, Goulds Pumps Inc., Seneca Falls, N. Y.
Some Steel Works Castings, by J. Roxburgh, Davy Bros. Ltd., Sheffield, England. Exchange paper presented on behalf of Institute of British Foundrymen.
High Strength Cupola Iron Practice, by Ralph S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee.
Titanium in Cast Iron, by E. R. Starkweather, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

10:00 a.m.—*Nonferrous Practice*

Chairman—Harold J. Roast, Canadian Bronze Co., Montreal, Canada; vice chairman—T. C. Watts, Falcon Bronze Co., Youngstown, O.
Casting 30 Per Cent Cupro-Nickel, by T. E. Kihlgren, International Nickel Co., Bayonne, N. J.
X-Ray as an Aid in the Production of Aluminum Castings, by George Stoll, Bendix Corp., South Bend, Ind.
Problems in Bronze, by Harold J. Roast, Canadian Bronze Co. Ltd., Montreal, Canada.
Report of Committee on Analysis of Defects, by H. M. St. John, Detroit Lubricator Co., Detroit.
Report of Committee on Recommended Practices, by H. J. Rowe, Aluminum Co. of America, Cleveland.

1:00 p.m.—*Exhibit Closes*

Afternoon—*Plant Visitation*

To Show Tomorrow's Methods

THROUGH the co-operation of the American Foundrymen's association and many manufacturers of foundry equipment and supplies, an exceptionally valuable foundry show will be staged in the Auditorium at Milwaukee, May 3 to 7, in conjunction with the annual convention of the association. Over 200 companies will exhibit a wide variety of products most essential in the economical production of castings. This is especially true at the present time with the industry operating at an unusually high rate and at the same time faced with a serious shortage of trained men.

In numerous instances the displays will feature new developments and refinements in equipment and supplies which have been perfected since the show a year ago. While the time may have seemed short for any great accomplishment along that line, it is certain that a careful study of the entire exhibition will show remarkable progress.

Many factors point to a most successful foundry show at Milwaukee. As may be noted on the opposite page, a large number of companies will be represented, thus assuring the exhibition visitor that practically every type of equipment or supply used in the foundry will be on display. Excellent facilities offered by the Milwaukee Auditorium make it possible to hold the technical features of the convention and the entire foundry show under one roof. The show itself will tax all the available space in the main arena, Mechanics hall, Juneau hall, Kilbourn hall and Walker hall, according to association headquarters. The Auditorium as indicated by the arrow in the illustration above is located within easy walking distance of practically all of the hotels of the city.

The exhibition of foundry equipment and supplies will open at 1 p. m. on Monday May 3 and will remain open until 10 p. m. that night. On Tuesday, Wednesday and Thursday the show will be open from 8:30 a. m. until 5 p. m. and on Friday from 8:30 a. m. until 1 p. m.

Exhibitors at Milwaukee

List Released April 7

A

Abrasive Co.
Abrasives
Air Reduction Sales Co.
Ajax Electric Furnace Corp.
Ajax Electrothermic Corp.
Ajax Metal Co.
Allis-Chalmers Mfg. Co.
Louis Allis Co.
Alpha-Lux Co., Inc.
American Air Filter Co., Inc.
American Brake Shoe & Foundry Co.
American Crucible Co.
American Foundry Equipment Co.
American Gum Products Co.
American Metal Market
American Optical Co.
Arcade Mfg. Co.
Armstrong-Blum Mfg. Co.
Associated Guard Manufacturers
Automatic Transportation Co.
Ayers Mineral Co.

B

Barrett-Cravens Co.
C. O. Bartlett & Snow Co.
Beardsley & Piper Co.
Bethlehem Steel Co.
S. Birkenstein & Sons, Inc.
Black, Sivalls & Bryson, Inc.
Black & Decker Mfg. Co.
Blaw Knox Co.
Blystone Mfg. Co.
Bradley Washfountain Co.

C

Campbell-Hausfeld Co.
Canada's Foundry Journal
Carborundum Co., Abrasive Div.
Carborundum Co., Refractory Div.
Edwin S. Carman
Carpenter Brothers, Inc.
Certified Core Oil & Mfg. Co.
Chain Belt Co.
Champion Foundry & Machine Co.
Chicago Mfg. & Distributing Co.
Chicago Retort & Fire Brick Co.
Clark Tructractor Co.
Clearfield Machine Co.
Cleveland Flux Co.
Cleveland Quarries Co.
Climax Molybdenum Co.
L. A. Cohn & Bros., Inc.
Combined Supply & Equipment Co.
Corn Products Sales Co.
Crucible Furnace Co.

D

Daily Metal Trade
Dayton Oil Co.
Delta Oil Products Co.
Wm. Demmler & Bros.
Detroit Electric Furnace Co.
Harry W. Dietert Co.
Dings Magnetic Separator Co.
Joseph Dixon Crucible Co.
Dodge Mfg. Corp.
Doelger & Kirsten, Inc.
Donald Sales & Mfg. Co.

E

Eastern Clay Products, Inc.
Economy Tool & Machine Co.
Electro Refractories & Alloys Corp.
Electro Metallurgical Corp.
Elwell-Parker Electric Co.
Employers Mutuals

F

Falk Corp.
Federal Foundry Supply Co.
Federated Metals Corp.
Fisher Furnace Co.
THE FOUNDRY
Foundry Equipment Co.
Foundry Supplies Mfg. Co.
Foxboro Co.

G

Galland-Henning Mfg. Co.
Walter Gerlinger, Inc.
Globe Steel Abrasive Co.
Great Lakes Foundry Sand Co.
Great Western Mfg. Co.
A. P. Green Fire Brick Co.

H

Hammond Machinery Builders, Inc.
Harnischfeger Corp.
Benj. Harris Co.
Hercules Powder Co.
Herman Pneumatic Machine Co.
Hickman, Williams & Co.
Hill & Griffith Co.
Edward Hines Lumber Co.
Hines Mfg. Co.
Hougland & Hardy
Hydro-Blast Corp.

I

Illinois Clay Products Co.
Illinois Testing Laboratories, Inc.
Industrial Minerals Co.
Ingersoll-Rand Co.
International Graphite & Electrode Corp.
International Molding Machine Co.
International Nickel Co., Inc.
The Iron Age
Ironton Fire Brick Co.

J

Jeffrey Mfg. Co.
Wm. F. Jobbins, Inc.
Johnston & Jennings Co.

K

Kindt-Collins Co.
H. Kramer & Co.
Chas. A. Krause Milling Co.

L

Laclede-Christy Clay Products Co.
Lava Crucible Co. of Pittsburgh
R. Lavin & Sons, Inc.
E. Leitz, Inc.
Linde Air Products Corp.
Link-Belt Co.

M

Machine Design
Macklin Co.
Macleod Co.
Manley Sand Co.
Martindale Electric Co.
Mathews Conveyer Co.
J. S. McCormick Co.
Metallizing Engineering Co., Inc.
Metals & Alloys
Mexico Refractories Co.
Milwaukee Chaplet & Mfg. Co.
Milwaukee Foundry Equipment Co.
Mine Safety Appliance Co.
Modern Equipment Co.
Mt. Jewett Fire Clay Co.
Mullite Refractories Co.

N

National Engineering Co.
Newaygo Engineering Co.
Niagara Falls Smelting & Refining Co.
Wm. H. Nicholls Co., Inc.
Norton Co.

O

S. Obermayer Co.
Oliess Core Binder Co.
Osborn Mfg. Co.

P

Palmer-Bee Co.
Pangborn Corp.
Parsons Engineering Corp.
Peerless Mineral Products Co.
Geo. M. Pendergast & Co., Inc.
Peoria Sand Blast Mfg. Co.
Penton Publishing Co.
George F. Pettinos, Inc.
Pickands Mather Co.
W. H. Pipkorn Corp.
Pittsburgh Crushed Steel Co.
Pittsburgh Lectromelt Furnace Corp.
Protective Equipment, Inc.
Pyro Clay Products Co.
Pyrometer Instrument Co.

R

N. Ransohoff, Inc.
Ready-Power Co.
Reeder Mfg. Co.
Republic Coal & Coke Co.
Republic Steel Corp.
Robeson Process Co.
Roloff Engineering Co.
Roots-Connersville Blower Corp.
Rotor Air Tool Co.
Royer Foundry & Machine Co.
Ruemelin Mfg. Co.

S

Sabin Machine Co.
Safety Engineering
Safety Equipment Service Co.
Safety Grinding Wheel & Machine Co.
Safety Sling Products Corp.
Sand Products Corp.
Claude B. Schneible Co.
Schramm, Inc.
F. E. Schundler & Co.
Simplicity Engineering Co.
Sloss-Sheffield Steel & Iron Co.
W. W. Sly Mfg. Co.
Eugene W. Smith Co.
Smith Oil & Refining Co.
Smith & Richardson Mfg. Co.
Werner G. Smith Co.
Spencer Turbine Co.
Sprinkmann Sons, Corp.
Standard Safety Equipment Co.
Standard Sand & Machine Co.
Standard Silica Corp.
Stearns Magnetic Mfg. Co.
Steel
Steelblast Abrasives Co.
Sterling Grinding Wheel Co.
Sterling Wheelbarrow Co.
Frederic B. Stevens, Inc.
Swan-Finch Oil Corp.

T

Tabor Mfg. Co.
Taggart & Co.
Tamms Silica Co.
Toledo Scale Co.
Truscon Steel Co.
W. S. Tyler Co.

U

Union Carbide & Carbon Corp.
United Compound Co.
U. S. Electrical Tool Co.
U. S. Graphite Co.
U. S. Hoffman Machinery Corp.

V

Vanadium Corp. of America
Vesuvius Crucible Co.

W

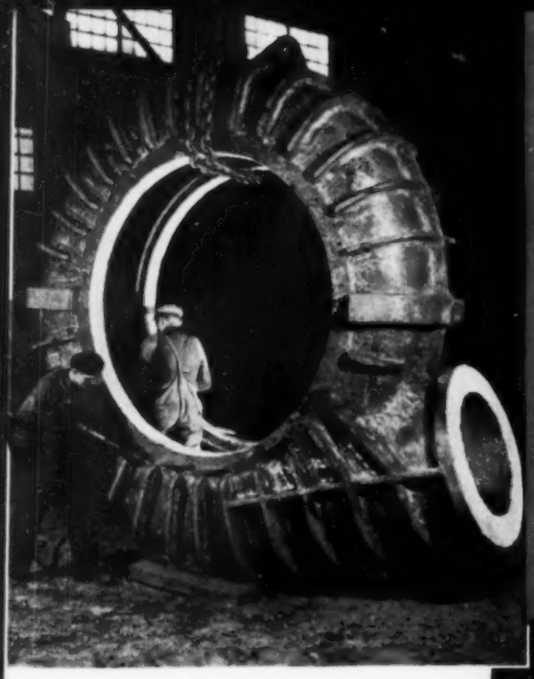
Wm. K. Wallace
Wehenn Abrasive Co.
Whitehead Bros. Co.
Whiting Corp.
Wilson Welder & Metals Co., Inc.
Willsea Works
Wisconsin Steel Co.
E. J. Woodison Co.

Y

Yale & Towne Mfg. Co.

Z

Zanesville Sand Co.



Steel Castings For Stiff Service

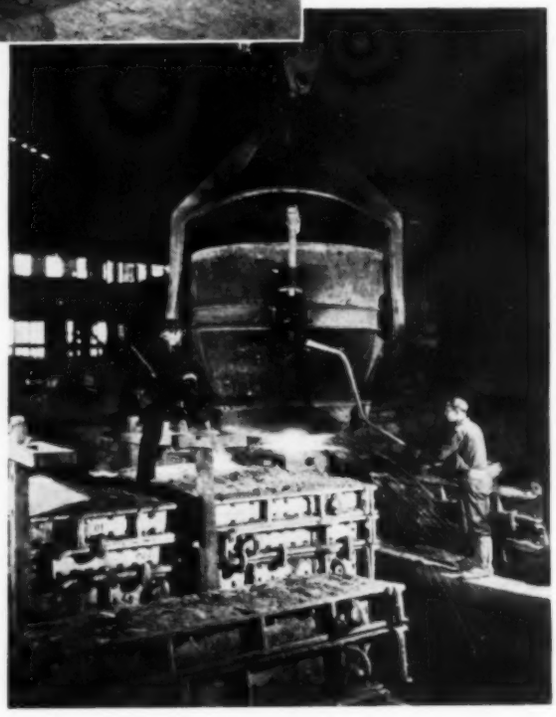
By C. E. HERINGTON

Fig. 1 (Left above)—Steel pump casing, weight 34,000 pounds. Fig. 2 (Left)—Swivel elbow for 28-inch pipe with manhole in one side. Fig 3 (Above)—One of these impellers rotates at 500 revolutions per minute inside the casing shown at upper left. Fig. 4 (Below)—Consistency is shown in this steel foundry where ladle and bail are cast steel

DAM and river improvement projects sponsored by the United States government have been responsible for the development of some unusual and interesting equipment, both for use in the construction of these improvements and as a part of the operating mechanism of the completed units.

In the construction of the 100,000,000 cubic yard fill for Fort Peck Dam in Montana, giant dredge pumps remove tons of muck from the Missouri river. Other pumps suck this material through approximately 70,000 feet of 28-inch specially designed pipe and discharge it in the dam fill. During the 1935 dredging season, an average of 108,800 cubic yards was dumped per working day.

Union Steel Casting Co., a subsidiary of Blaw-Knox Co., Pittsburgh, is completing work on an order for 30 pump casings, and 20 impellers totaling 597 tons, and also 77 tons of pipe sections for use on this project.



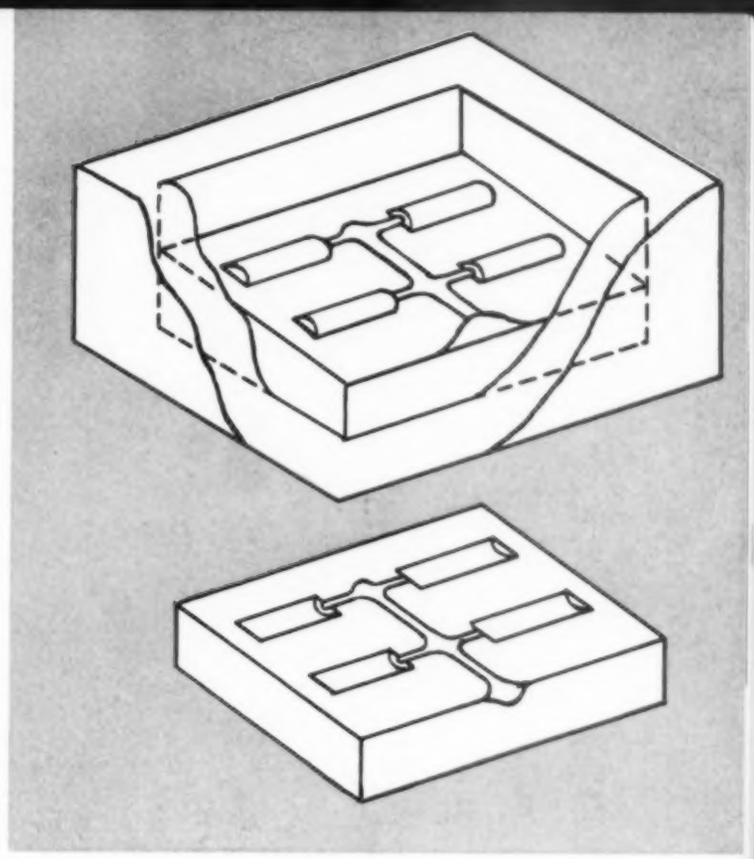
Pump Part Cast Integral

The pump casing in Fig. 1 weighs 34,000 pounds and has an inside diameter of approximately 7 feet with a wall thickness of 3¼ inches. Specifications called for one-piece casting. Size and weight, also unusual design presented some casting difficulties. Ordinarily, a casting of this size would be cast in at least two sections which later would be bolted together through suitable flanges.

Actual steps taken in the molding and casting processes are interesting. Special sand cores and arbors were developed by Union Steel Casting Co. Precise handling was required in placing these cores in the mold to insure a uniform section of metal throughout the finished casting. The mold was dried in an oven for 40 hours at a temperature of 650 degrees Fahr. Steel was poured into the mold from a 35-ton capacity ladle at a temperature of 2900 to 2950 degrees Fahr. Analysis of the metal showed: Carbon, 0.40 per cent; sulphur, 0.04 per cent; phosphorus, 0.04 per cent; manganese 0.70 per cent; and silicon, 0.30 per cent.

The castings were sand annealed in the mold for about 12 hours, after which they were shaken out and the heads and gates (*Please turn to page* 124)

Brass Mold Reproduces Detail



Sketch at the top indicates the appearance of a plaster negative using semicylindrical pieces. The one on the bottom shows the plaster-asbestos positive mold into which the brass is poured. Parts of the sides are broken away for clearness

DURING the past few years considerable interest has developed in the production of miniature railroad trains which are constructed on an exact scale of ¼-inch to the foot. The castings generally are aluminum-base or zinc base alloys, and are produced by sand casting, die casting or by permanent molding. However, when sand molds are used, difficulty often is encountered in obtaining the requisite sharpness of detail unless exacting care is employed.

Consequently, thought turns to the use of metal molds for the work, and the question arises on how the molds can be made in the producing foundry. Generally, that foundry is engaged in nonferrous work, and the material selected for the mold will be in that field because of the familiarity in handling. Brass or bronze will serve satisfactorily, and with a little care the molds will have a smooth surface and possess the required sharpness of detail.

Manufacture of the brass or bronze molds requires several steps. The first is the making of the master pattern or patterns of the pieces that are to be reproduced. They will be slightly larger than the final desired castings to allow for shrinkage, and the proper amount will have to be based on the experience with the particular alloys being used.

After the master patterns are made, a number of them are mounted on a perfectly flat board with the runners and gates in position in the same manner as preparing a gate of patterns except that the gates are placed on the joint or parting. A box is built all around the board containing the patterns, so that the box extends about 1½ inches above the pattern. Board, box and patterns are given a thin coating of oil so that the plaster of paris which is poured in later can be removed without any sticking. The plaster will form a negative or mold which will be used in preparing the positive plate from which the final brass mold is made. Straight plaster of paris, liquid enough to flow easily, can be used.

When the plaster of paris negative has solidified, the sides forming the box are removed carefully to prevent cracking the plaster, and then the pattern plate is taken off, the same precaution being observed. The plaster negative is permitted to dry thoroughly in air, and then it is ready for the next step. First it is shellacked, and after drying is oiled on the face and on the four sides. Then the plaster negative is laid face up on a flat board or surface several inches larger all around. As previously described, a box is built around the plaster negative allowing a space of about 2 inches all around. The box should extend about 2 inches above the top of the negative, or a total height of 3½ inches.

The box sides and board should be oiled, and then a plaster of paris mixture composed of 7 parts of plaster, 4 parts of asbestos fiber and 1 part of china clay or fireclay, mixed with water to give the necessary fluidity, is poured in. Sometimes the plaster of paris is mixed with brickdust, fine silica sand, silicon carbide sand, or wood flour instead of the asbestos and fireclay. Those materials are added to permit faster drying, and to prevent cracking. This same mixture is used to make a flat cope closing the plaster mold.

The plaster mixture poured in forms the plaster positive in which the final brass mold is made. As in the previous cases, the plaster positive is permitted to air-dry thoroughly, but a further step is required before it is suitable for use. That step is to heat it until it is bone dry. Every vestige of moisture must be removed. Absolute removal of moisture from the plaster only can be accomplished by raising to a red heat and holding it at that temperature for several hours. If that is not done, the molten metal will not lie quietly.

When drying or heating is completed, the plaster mold and its accompanying cope are removed from the oven or furnace and permitted to cool sufficiently so that they can be handled without discomfort. The brass or bronze is poured in (*Please turn to page* 130)

Metal Changes During Enameling

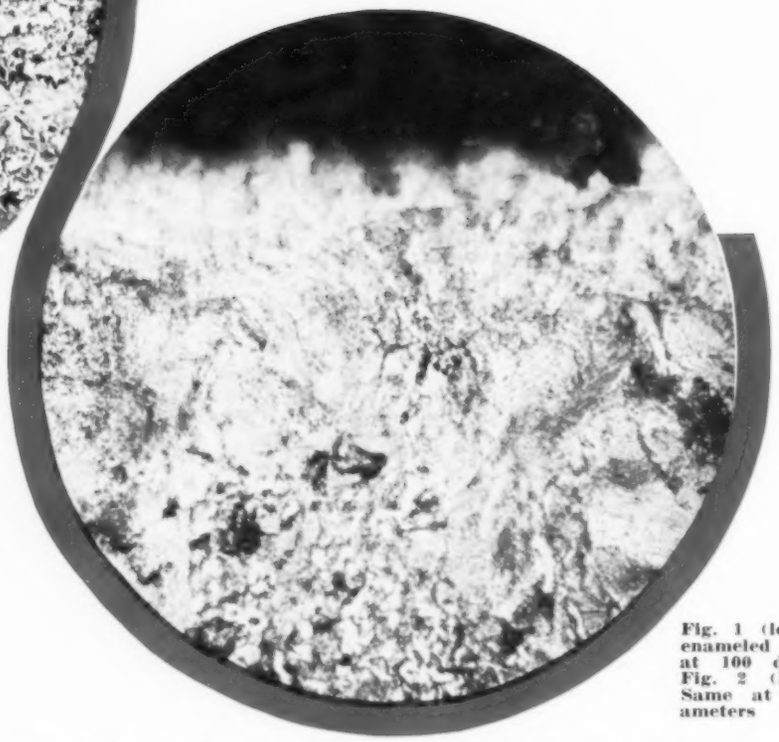


Fig. 1 (left)—Unenameled casting at 100 diameters Fig. 2 (Right)—Same at 500 diameters

By R. B. SCHAAL

DRY process vitreous enameling is accomplished in eight consecutive steps which include:

1. The surfaces to be enameled are cleaned by pressure blasting. Any holes are filled with ceramic filler.
2. Ground coat is applied wet, either by spraying or painting, and dried.
3. The dried, ground coated casting is placed in the enameling furnace at about 1600 degrees Fahr. and fired for 10-12 minutes, until material is thoroughly fused. It is then withdrawn.
4. The red hot casting, resting in a tilting cradle, is dredged with a thin, even coating of enamel powder, which adheres as applied due to partial fusing.
5. The dusted article is returned to the furnace, and allowed to remain for 3-4 minutes, or until the enamel is evenly fused and glossed over.
6. Upon removal from the furnace the casting, replaced in the cradle, is dusted again with enamel powder.
7. The casting is then returned for the final fire, of 2 to 3 minutes duration.
8. After the finished coat fire, the casting first is inspected tentatively while hot. If no flaws are visible, it is allowed to cool, usually protected from air currents and dust.

Firing and dusting take about 20 to 25 minutes. During the ground coat fire, the casting probably reaches the furnace temperature, about 1600 degrees Fahr. The period of cover coat fire is much shorter, so it is quite likely that the temperatures reached will be somewhat lower. Probably the casting will not reach 1550 degrees Fahr. during the fire of the first cover coat, and may not exceed 1500 degrees Fahr. or 1520 degrees Fahr. during the final fire.

Wet process enameling is accomplished in the following steps, some of which may be omitted, or varied depending upon the finish required:

1. The surfaces to be enameled are pressure blasted. Blasting required in this case usually is more thorough than that for dry process enameling, due to certain differences in ground coat characteristics.
2. Ground coat is sprayed over the blasted surface in a booth and dried.
3. The pieces are placed in the enameling furnace at 1360-1380 degrees Fahr. and allowed to remain until the ground coat matures, usually about 30-50 minutes, depending upon the size of the load.
4. When the ground coat is matured, the castings are removed from the furnace, and placed in racks, to cool to room temperature.
5. The first cover coat is applied by spraying, and is dried.
6. The castings are placed in the furnace at 1320-1340 degrees Fahr. and are fired until gloss is thoroughly developed. The time required being usually 30 to 40 minutes.
7. After cooling to room temperature, finish cover coat is applied over the fired first coat by

spraying, and the enamel again is dried.

8. The finish coat is fired in about the same manner as first cover coat; possibly a slightly shorter time may be required.
9. After removing from the furnace, the finished castings are cooled, on racks, to room temperature, and inspected.

Enameling by the wet process involves three heatings and coolings of the metal, over a period of about 2 hours furnace time, as compared to about 30 minutes continuously above red heat for the dry process, out, in general the trend of alteration in casting structure is in the same direction for either process.

In general, the effect of such thermal treatment of the castings would be that of annealing.

Annealing usually tends to soften and weaken cast iron, but usually it enhances the machinability. No marked change in analysis should be expected, except an alteration in the proportions of combined carbon and graphite. Annealing tends to decrease combined carbon and increase graphite, without altering total carbon to a significant extent.

The general trend of structural change upon enameling ⅛-inch section castings by the wet process is illustrated by the accompanying micrographs.

Fig. 1 shows the unenameled casting at 100 diameters. The matrix is largely dark lamellar pearlite, with white ferrite adjacent to fine, net-work-like graphite nests. The whole structure is broken up in the usual manner with flakes of black graphite. The pearlite grains are bordered by a certain amount of transformed eutectic, or steadite.

Fig. 2 shows this same unenameled casting at 500 diameters.

Difference in Properties

(Heated and Unheated Bars)

Heated Bars	Deflection at 200 Pounds Inches	Deflection at Breaking Inches	Breaking Load Pounds
No. 1	0.50	0.75	1020
2	0.45	0.60	880
3	0.55	0.80	1080
Total	1.50	2.15	2980
Average	0.50	0.72	993
Unheated Bars			
No. 4	0.30	0.45	1280
5	0.25	0.50	1340
6	0.35	0.50	1300
Total	0.90	1.45	3920
Average	0.30	0.48	1303

Fig. 3 is from the same casting, after enameling, at 100 diameters showing the effect of the annealing action. The pearlite is converted almost entirely into ferrite and graphite, probably weakening the casting.

Fig. 4 is the same as Fig. 3, at 500 diameters.

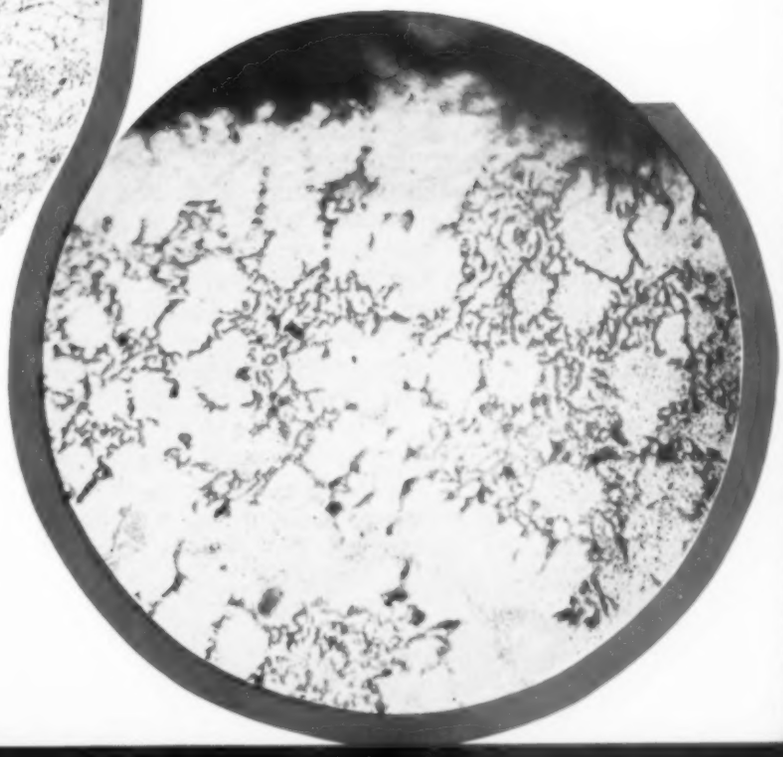
The transformation of pearlite, which contains combined carbon, into ferrite, which contains no carbon, and graphite, or free carbon, is accomplished with only an insignificant loss of total carbon.

Analysis of the casting follows:

	Before Enameling Per Cent	After Enameling Per Cent
Silicon	2.13	2.13
Manganese	0.67	0.67
Phosphorus	0.55	0.55
Sulphur	0.085	0.085
Graphitic Carbon	3.00	3.40
Combined Carbon	0.43	0.03
Total Carbon	3.43	3.43

The chemical and metallographic changes given are characteristic. In varying degree these alterations of analysis and structure always will be produced (*Please turn to page* 148)

Fig. 3 (Below)—Same casting after enameling, at 100. Fig. 4 (Right)—Same as Fig. 3, at 500 diameters



Concentrates on M

INDUSTRIAL development throughout the years and its relation to modern living, both in the United States and European countries, presents an interesting study. Many industrial concerns started in the earlier days of the United States have either completely passed out of the picture or have been merged so many times with other enterprisers that they no longer hold any semblance to their original business structure. This in itself precludes any possibility of carrying on fundamental operating policies as laid down by the founders. Therefore, it becomes more interesting when today we stumble on a modern prosperous concern still operating after fifty odd years under the precepts of its founder. Naturally enough, the second and third generations of this family business, while maintaining the basic principles of policy, have been far sighted enough to not only accept, but in many instances to initiate, the most modern methods of industrial management.

This accounts for the top rate standing of the Bullard Co., Bridgeport, Conn., manufacturers of machine tools, and since a visit to this plant has revealed many of the most modern plant operating features, it seems worth while to give some time to the study of foundry methods as applied in the manufacture of machine tools.

Inasmuch as machine tools are used for the manufacture of untold numbers of products in daily use, many of which require extreme accuracy, it is hardly necessary to call attention to the fact that accuracy and strength in the finished parts of the machine are essential. The castings which make up these machines must be perfect. With this in mind, it is easy to see that specifications of castings must conform to rigid standards. Incidentally, machinability and uniformity of castings are extremely important. Of course, many other factors enter into the acceptance by the machine shop of castings to be used therein. When all conditions have been considered, it is not to be wondered that the Bullard Co. should see fit to maintain its own foundry and thereby control the elemental factors which result in the highest standards for finished products.

The plant is located in the Black Rock section of Bridgeport, Conn., on the main line of the New York New Haven & Hartford Railroad which provides facilities for bringing in the raw materials for foundry use. The foundry building 150 x 400 feet is divided into three longitudinal bays by two rows of columns. Ample provision for light and ventilation has been made by continuous windows in the side walls, and for the comfort of employes the building is well heated. A section of one of the bays is equipped with four coke fired crucible pit furnaces for the production of non ferrous castings. The remainder of this bay as shown in Fig. 7 is devoted to the production of small and medium weight gray iron castings.

The side bay is spanned by three traveling cranes which assist in handling the larger patterns as well as the larger pouring ladles. Molds are made in green sand in cast iron flasks, and each flask is provided with trunions to facilitate the handling by beam slings sus-

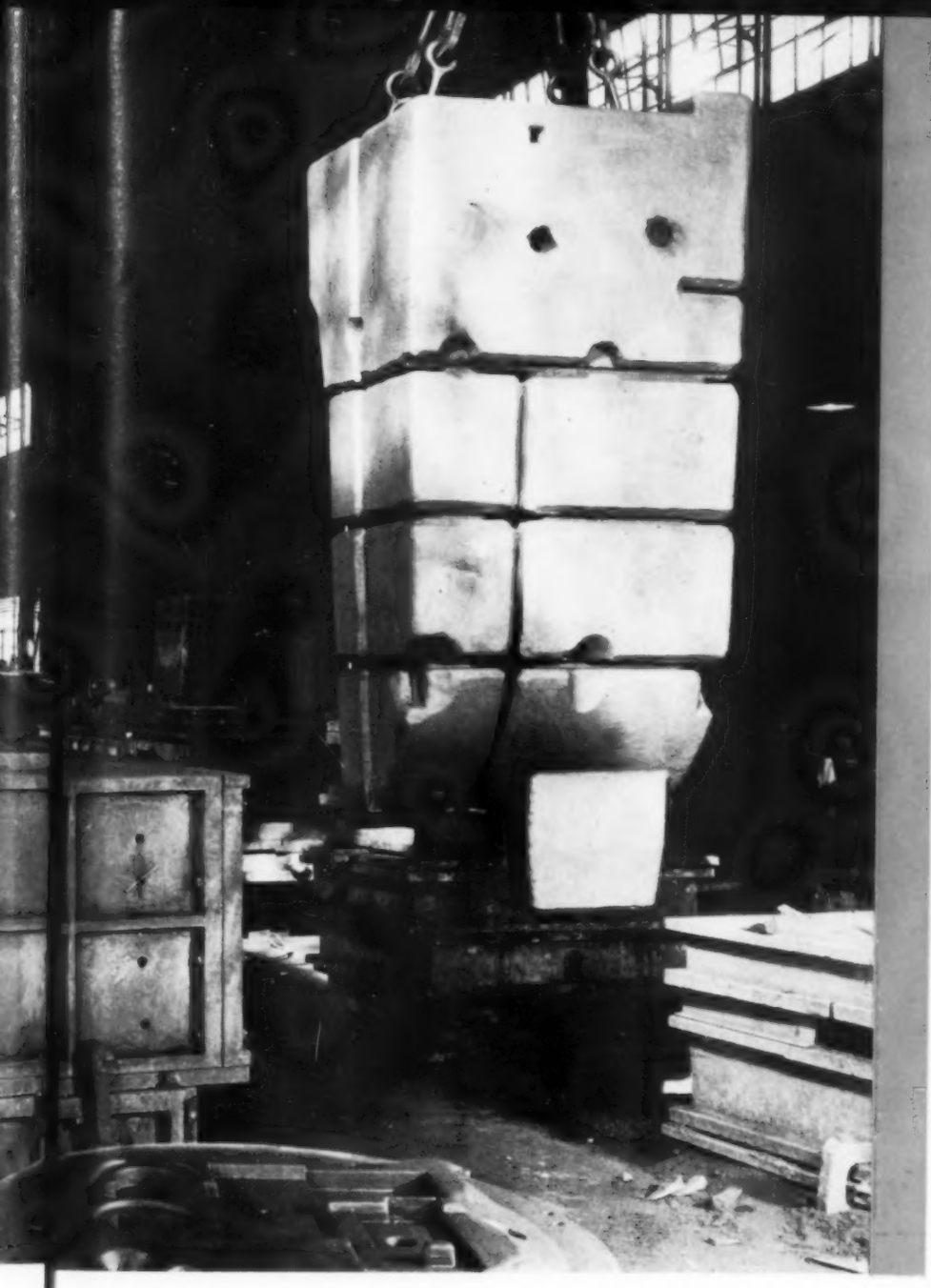


Fig. 1—Large base castings are made in dry sand molds which are assembled and cored in pits in the floor.. The cores are made up principally of reclaimed sand

n Machine Tools

pended from cranes. It is quite natural that in addition to the reliability in holding the castings true to shape and dimensions, the iron flasks over an extended period of time show marked economy in comparison with the ordinary wood flasks. Even at the close of their active life or when for any reason they become obsolete, the iron flasks still have a scrap value when used as part of the cupola charge in heats requiring a percentage of scrap.

All the heavier castings are molded and poured in the center bay. Practically all these castings are made in dry sand molds, a method which eliminates many of the hazards incident to green sand molding and a method which in addition produces a clean, smooth skin on the castings. Under modern conditions surface appearance plays an important part in the salability of castings. This feature is emphasized in this particular plant where the castings are given a preliminary coat of paint before they are transported from the foundry to the machine shop.

Molds are loaded on cars and dried in the type of oven shown in Fig. 8. Heat from coke burned in a fireplace outside at one end enters the oven through an arched tunnel in the center of the floor and escapes upward through perforations in the arch. Sections forming the roof of the tunnel are molded from a refractory plastic material, dried and set in place. When a section eventually wears out after long service, it is removed and readily replaced by another. Uniform distribution of heat in the oven is effected through check dampers over openings in the side walls leading to the main flue. Temperature of the oven is recorded through suitable pyrometer apparatus.

With a view toward further refinement of operation and consequent fuel economy the company is preparing to install a recently developed type of heater in the various ovens. At the time of writing, this work had not progressed to a point that might invite comment. However, it is interesting to note that this type of heater has been installed elsewhere where it is claimed to control humidity as well as temperature automatically and thus insure maximum drying conditions throughout the entire oven. The present ovens have been in continuous service for many years.

Part of the space in the center bay is occupied by the superstructure of a hydraulic cleaning chamber in a basement which extends under the greater part of the foundry. The concrete walls of the chamber are covered with steel plate which has to be renewed occasionally owing to the smashing impact of miscellaneous material driven like so many projectiles.

This method of cleaning cores out of castings, while not new, is in use in only a comparatively small number of foundries. The method and several specific installations have been described in previous issues of THE FOUNDRY. The basic principle is the same in each instance, direction of a stream of water at high pressure against the sand, but the actual setup of each unit, ow-

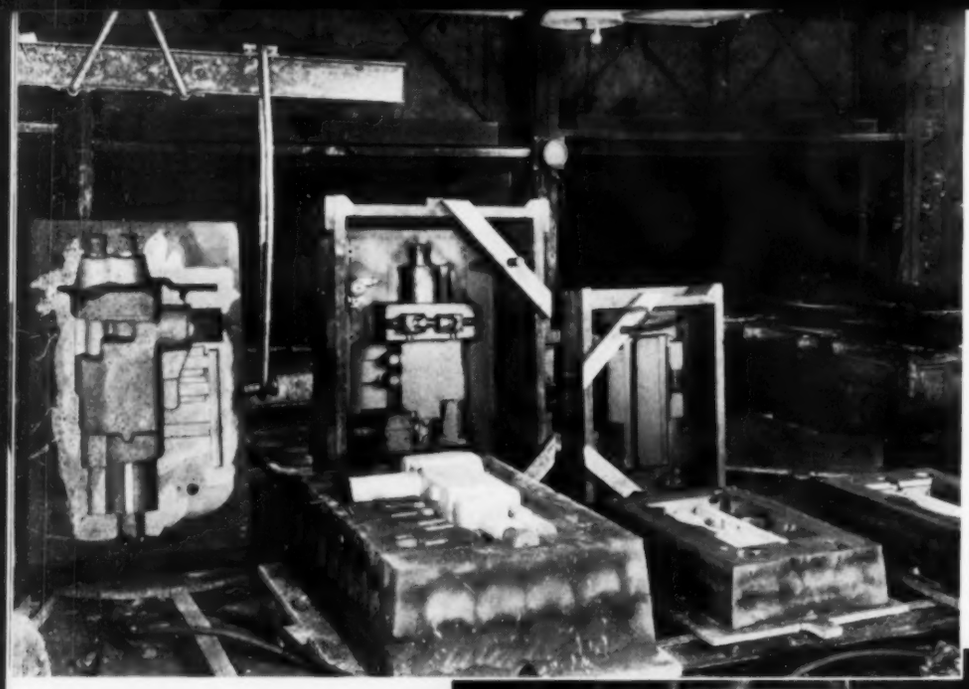


Fig. 2 (Above)—Cylindrical pins in the corebox form guide holes for placing the cope core on the drag core. Fig. 3 (Right)—Showing method of assembling a number of dry sand cores in iron casing to form mold

ing to local conditions is slightly different from the others. In the Bullard company's foundry the basement presented the logical location for the hydraulic cleaning chamber.

Fig. 4 (Below)—Green sand molds are made in cast iron flasks

The opening in the floor of the foundry is covered by a steel hatch cover suspended from beams which in turn are mounted on wheels running on rails on either side of the opening. The rails are mounted on a low concrete wall and extend a distance equal to twice the length of the opening. While the cover is in the open position, the castings to be cleaned are lowered by the crane into the cleaning chamber. The cover then is shoved forward over the opening to prevent water and loose material from flying upward.

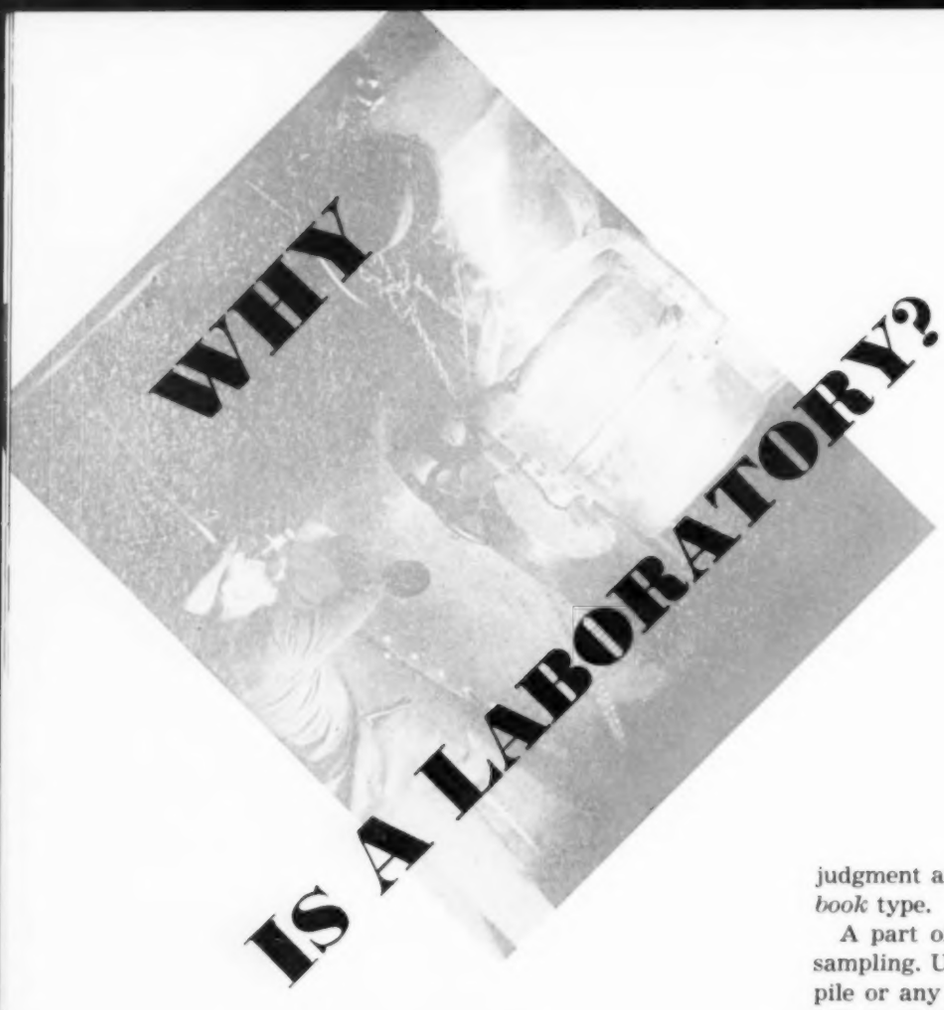
Experiment with various nozzles in-

dicated that the most satisfactory service is secured from a nozzle ⅝-inch diameter. Water from a pump in an adjoining part of the basement is driven through this nozzle at a pressure of 450 pounds per square inch and at the rate of 450 gallons per minute. This powerful jet of water tears the core apart and washes it out of the casting at a terrific speed. For illustration in a typical instance it is claimed that one operator with the water gun can clean the cores out of a large casting in 3 hours, as compared with 9 hours work by 3 men using the ordinary hand tools. Two nozzles project inward through the wall of the chamber, one above and one below. The operator standing on

(*Please turn to page* 152)

Fig. 5 (Above)—A more thorough mixing of the metal is secured in a forehearth before it enters the ladle. Fig. 6 (Left)—Typical group of castings showing how readily the sand peels from the surface

Fig. 7 (Below)—After the mold is filled a certain amount of iron is allowed to flow through the risers



WHY IS A LABORATORY?

By H. A. SCHWARTZ

ANYBODY can hire a chemist. The rate he will pay will depend on what kind of a chemist, who may be anything from a boy just out of high school to a PhD with years of experience in specialized subjects. Even if the chemist is to be purely an analyst, the ratio of compensation for the worst and best qualified may be as one to ten or so. What sort of a chemist does a foundry need? The answer depends altogether upon where the foundry is trying to go.

The very simplest need is for someone to analyze a product from time to time to see if it falls within the limits prescribed by the buyer or by the producer to meet the properties which are set by the buyer. Here the task is entirely repetitive and in large operations can be simplified to the utmost by standardizing methods and selecting equipment to make the work as fool proof as possible. In such a laboratory the cheapest *conscientious* help available will suffice if properly directed.

This writer has often been surprised how much faith some executives place in these technicians as chemists. Unfortunately an individual who can determine perfectly reliably one of the usual five elements in a low carbon steel can not necessarily be relied upon, ipso facto, to make an accurate determination of say aluminum in the same steel or to separate quantitatively molybdenum from chromium in highly alloyed steels. In the one case one merely follows well established instructions, in the latter, unless the laboratory has sufficient experience in the particular field to have standardized its process, the chemist must make many decisions and anticipate many interferences to provide against totally erroneous results. These exercises of judgment are totally beyond the technician of the *cook book* type.

A part of this problem begins with the question of sampling. Unfortunately, just any lump of coal out of a pile or any drillings out of a casting, do not represent the chemical composition of the entire lot supposedly to be judged by the samples. Many a superintendent and unfortunately not a few chemists, seem to regard the admittedly laborious processes of preparing accurate samples as just so much *horse feathers* which some super careful person had written up as the best possible procedure but to which no attention need be paid for *practical* purposes.

Now the great specification making groups, such as the American Society for Testing Materials, have many things to occupy their time more important than writing lengthy but needless descriptions of procedure just to make the books bigger. A given analysis, or test of an engineering property for that matter, is made to determine the characteristics of a given lot of material. What that lot is depends upon the purpose of the entire investigation.

If one desires to write a paper on the relation of graphite content to the (cross bending) strength of cast iron, he may want the graphite content at the point of fracture where the physical property was measured and neither know nor care whether the graphite content there represents fairly the entire bar, the entire ladle or the day's production or not.

If the laboratory work is done as a protection to buyer or seller or both in a commercial transaction, the test must represent a relatively large lot of material. How it must represent this will appear from a few examples.

Everyone knows that when buying coal he will get a certain amount of noncombustible ash. One does not seek to guard against all pieces of noncombustible material but only against more than a certain limited amount, as an average, over a considerable period of

time. If at one moment there is relatively too much incombustible, this can, in reason, be made up by another interval in which there is less than the average. A fuel sample should thus represent a *fair average* of all the material received and it is not necessary that a sampling method be such as to disclose minor fluctuations in quality from that average. A very large sample selected so as to exclude accidental variations thus is indicated.

In the purchase of ferroalloys one is first interested in getting all the alloy manganese, vanadium, chromium, molybdenum or what not he pays for. This can be secured by drawing a reasonably large average sample from an entire shipment. Besides this, in order that additions may be figured correctly, we must know whether the shipment is uniform in alloy content. A single large sample gives no evidence on this point and individual samples from sublots, say containers, which are believed to be uniform within themselves must be chosen. A sensible solution of sublots generally is possible only from a knowledge of the history of the shipment, any single unit representing material of the same manufacturing lot. *Known* minor variations in a lot of known average content are in no sense objectionable, unpredictable variations may be the cause of serious difficulties.

Melting Stock May be Contaminated

Much more complicated is the exclusion of undesirable constituents above a specified limit. Assuming, probably unconsciously, it to be true that any steel casting containing over 0.05 per cent phosphorus legitimately should be rejected, the manufacturer will do well to so sample his product as to know that he is getting the highest possible phosphorus or the customer later may get something on him. Also, if he is making acid steels, he must know that his melting stock is not contaminated with high phosphorus material in some way so that from a pile whose average phosphorus is all right, abnormally high phosphorus material for one charge might be obtained.

Observe that in varying degrees in all cases one tests or analyzes material to obtain knowledge not only of its average properties but of its uniformity. If a material must pass a minimum physical specification, it benefits neither buyer or seller to have any considerable amount of the product exceed those limits. Since the buyer must design for minimum quality of product, he is just as well off with a low average value and great uniformity as with a much higher average and a great *scatter* of results.

It should be one of the functions of metallurgical control to promote uniformity of product. This commentator constantly is surprised at the bulk of statistics gathered in many plants which afterward are not used to the full for the guidance of the operators. The rule rather than the exception seems to be to use laboratory data only to see that certain material conforms to certain requirements and then disregard its further exploitation.

Scatter of data is measured by a constant called *standard deviation*. The deviation of a given observation is the amount by which it differs from the average of many observations. The standard deviation of a group of observations is the square root of the average of the *squares* of the individual observations. Simple to calculate, it is also very valuable in use. An easy way to compute it is to take the sum of the squares of all the observations, divide by the number of observations, subtract the square of the mean value of all the observations and take the square root;

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{n} - \overline{x^2}}$$

Whenever we have a considerable number of analyses or tests obtained under normal operating conditions, we can find the expected average and standard deviation easily. It is a property of the commonest distribution curve that values differing from the average by more than 3σ (3 times the standard deviation) should occur so rarely that any value outside this range can be assumed to have a determinable cause outside the usual operating conditions.

If one draws on co-ordinate paper a horizontal line representing the expected average value, say tensile strength, and two parallel lines, three times the standard deviation above and below this line respectively, then if we get any value which does not fall between the latter lines, we may be almost sure that some change in operating practice was to blame. If several observations fall outside, we can be sure something is wrong and can go look for it. The cause may lie in raw material, equipment, or personnel, but something unusual certainly has happened.

Furthermore, since the standard deviation of the average of nine observations is $\frac{\sigma}{\sqrt{9}} = \sigma/3$, the average of every group of nine observations in sequence must fall within $\pm\ \sigma$ of the expected value. If this does not happen something is going wrong continuously.

A vast deal of inconclusive argument goes on in foundry circles as to the effect of say silicon content on foundry losses. Somebody collects a lot of analyses during intervals of high losses and if these differ from what he thinks is the usual average, says the difference explains the losses. This imaginary example includes two fallacies. Possibly something else changed beside the silicon content or possibly the silicon changed on good and bad (*Please turn to page* 160)

Cast Camshafts and Crankshafts Possess Many Advantages

By FRED J. WALLS
International Nickel Co., New York

This is the second of a series of two articles abstracted from a paper presented by the author at the Feb. 9, 1937 meeting of the New England section of the Society of Automotive Engineers. The first article appeared in the March Issue.

THERE are several methods from a foundry standpoint which might be used in making cams, but the two most successful methods are differential hardening and controlled chill, both of which have been described in the literature quite extensively, but which may be outlined briefly to refresh our memories as follows:

The first method was developed by the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., whose present daily production amounts to approximately 15,000 automotive camshafts of several different designs. After several years experimenting the firm selected a composition as follows: Total carbon, 3.10-3.40 per cent; silicon, 2.10-2.40 per cent; sulphur, 0.10 per cent max.; phosphorus, 0.20 per cent max.; manganese, 0.50-0.75 per cent; chromium, 0.75-1.00 per cent; nickel, 0.20-0.40 per cent, and molybdenum, 0.40-0.60 per cent.

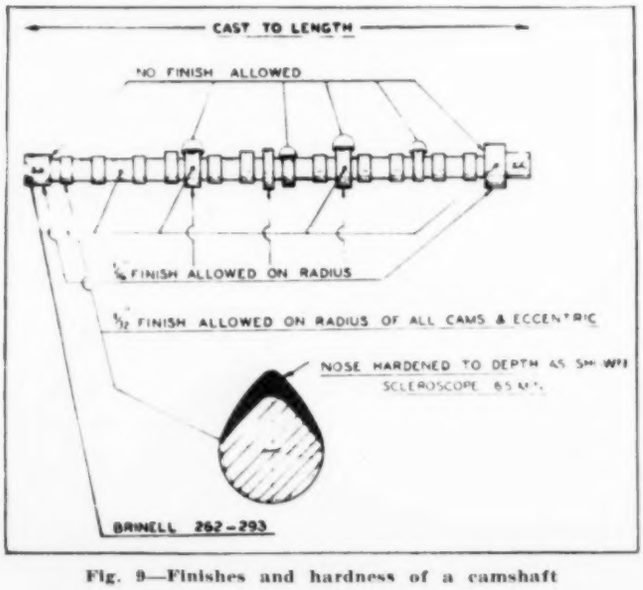

CAST TO LENGTH
NO FINISH ALLOWED
FINISH ALLOWED ON RADIUS
FINISH ALLOWED ON RADIUS OF ALL CAMS & ECCENTRIC
NOSE HARDENED TO DEPTH AS SHOWN
SCLEROSCOPE 65 MIN.
BRINELL 262-293

Fig. 9—Finishes and hardness of a camshaft

This metal, called "Proferall" (processed ferrous-alloyed iron) is a duplexed cupola-electric furnace iron having a Brinell hardness as cast in green sand of 262 to 293. They are molded, usually four in a mold, on heavy molding machines at a rate of approximately 45 per hour (depending on size and number) in a mold placed on a conveyer, poured and allowed to cool 45 minutes before shaking out and placing on another conveyer as shown in Fig. 28, to be taken to the cleaning room where they are shot-blasted, snagged and ground.

Subjected to Impact Test

When cooled to 150 degrees Fahr. or under, they are given an impact test as indicated in Fig. 24, by placing in a fixture supporting the shaft from each end, and dropping a 35 pound weight a distance of 14 inches, striking the shaft in two places. Hardness on the gear blanks and bearings are checked on a Gogan, and file tests made on the cams after which they are centered and straightened. Finishes and hardness are shown in Fig. 9. A finished 8 cylinder shaft is shown in Fig. 26.

The hardening operation on the nose of the cams may be carried out by either the flame method or the high frequency method. The principle involved is to heat rapidly the part above the critical, and allow sufficient time for penetration of the heat to the desired depth, and by rapid cooling a martensitic structure is obtained on the nose as shown in Fig. 9 having a scleroscope hardness of 65 minimum.

The second or *controlled chill* method was developed by Ford Motor Co., Dearborn, Mich., using an iron melted in the cupola having the following composition: Total carbon, 3.30-3.65 per cent; silicon, 0.45-0.55 per cent; manganese, 0.15-0.35 per cent; copper, 2.50-3.00 per cent, and chromium, 0.00-0.25 per cent. These cams are produced two in a mold in green sand without chills and gated as shown in Fig. 10. The casting is mostly gray with the cam tips white for a specified depth as illustrated in Fig. 13.

Accurate metallurgical control of the melting and pouring operations as developed by Ford metallurgists has made this method successful and economical. Adjustments in the composition of the molten metal are made at the cupola in 1000 pound ladles when found necessary. This is determined by pouring 1¼ inches round test bars 6 inches long in dry sand molds, breaking them and examining the fracture.

Chill Depth Controlled by Alloys

Ferrosilicon or ferrochromium is added to decrease or increase, respectively, the chill depth on the nose of the cams which must be held to within ⅛ inch. It is claimed that the high percentage of copper lessens the usual tendency of variable chilling capacities, and that a minimum amount of ladle *doctoring* is required due to its stabilizing effect. Rigid shafts shown in Fig. 14, without a measurable amount of wear are produced by this method.

In addition to the two methods outlined previously, there are others that should be mentioned. One is the use of chills in the mold, either rammed in or inserted in prints, to produce white iron on the cam lift and nose, and a composition suitable to obtain gray sections in the parts requiring machining operations. This was the first method used in casting cams and is still employed where the quantities required by the customer are small.

Another method is to select an alloyed iron that will cast gray with good machinability and that will respond to quench hardening. This method is used in designs where susceptibility to warpage is not likely to be encountered. Air-hardening alloyed irons have been developed and castings made of these irons are considerably less likely to warp due to lower differential temperatures.

Crankshafts have been made from all kinds of materials, both in the forged and in the cast form, but not until recently were the cast products considered safe for use in high speed engines. The Ford Motor Co. after lengthy and costly experiments in the laboratory and in service, adopted an alloy cast steel crankshaft. Between two and three million of these shafts have gone into service on Ford automobiles with a marked reduction in failures below those which previously were encountered with the employment of forged steel crankshafts.

The merits of the cast steel shaft over the forged are said to be: 1. Economy of manufacture, due to 8 less fabricating operations and the removal of 9 pounds of metal as compared to 24 pounds. 2. Improvement in engine performance, due to a decrease in weight from 66 pounds to 56 pounds in the finished shaft and a lower coefficient of friction. 3. Twice the resistance to fatigue failures, which probably is due to a much lower sensitivity to the so-called notch effect in the portions undergoing stresses.

Metal Is Melted in Electric Furnace

The composition and physical properties of Ford cast alloy steel, which is melted in the electric furnace, are as follows: Total carbon, 1.35-1.60 per cent; manganese, 0.60-0.80 per cent; silicon, 0.85-1.10 per cent; chromium, 0.40-0.50 per cent, and copper, 1.50-2.00 per cent.

Heat treatment consists of heating to 1650 degrees Fahr. and holding for 20 minutes; air quench to a minimum of 1200 degrees Fahr.; reheat to 1480 degrees Fahr. and hold 1 hour and cool in furnace to 1000 degrees Fahr. in 1 hour. Physical properties after heat treatment are: Tensile strength, 95,000 to 110,000 pounds per square inch; (*Please turn to page* 163)

Figs. 10 to 27—Various types of cast camshafts and crankshafts

QUESTIONS and ANSWERS

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Iron Should Be Machinable in Thick and Thin Sections

We are endeavoring to work out an iron mixture which will be suited best to making carburetor castings. These castings must be soft enough to machine at production speeds; be free of holes, etc. In view of the combination of wall thicknesses, from ⅛ to ¾-inch, all of which are machined in the same way, it has proved quite difficult to get an iron that would run without causing porosity in the heavier sections and still be soft. All castings are heat treated. Can you suggest a mixture proper for this type of casting?

Production of the carburetor castings is difficult due to the wide variation in section thickness, and as you stated, if the iron is soft enough to produce a gray fracture in the thin section, the heavier portion will be open and porous. Likewise, if the iron is suitable in composition to produce a good gray fracture in the heavy section, the thin section will be hard, or even chilled.

However, we believe that suitable results may be obtained through the use of nickel addition. The method of determining the amount of nickel to be added is to determine first the amount of silicon which will produce the desired gray fracture in the ⅛-inch section, which we will assume to be 2.30 per cent. Then do the same for the ¾-inch section which we will assume to be 1.60 per cent. The next step is to determine the base silicon from which to work, and that usually is the amount employed to produce the desired fracture in the heavy section, or, in this case 1.60 per cent. Subtracting the latter from 2.30 per cent which was required for the thin section, leaves 0.70 per cent difference in silicon content. Since 2 parts of nickel are equal in graphitizing effect to 1 part of silicon, 2 x 0.70 per cent equals 1.40 per cent which is the amount of nickel required with 1.60 per cent silicon to produce castings which will be machinable in the ⅛ and ¾-inch casting sections.

The percentages of silicon previously mentioned are of course selected at random, and may not be the same as you might select on the basis of the practice at your foundry. However, all that is necessary is for you to substitute the values you would employ as the principle is just the same. The figures obtained, of course, will form a base from which to work, and with a little experimental work on your part, that is adjustment of the silicon and nickel content, you can soon determine the best composition for the work.

Gives Procedure for Casting Brass Surface on Iron

We have the problem of casting iron onto brass as indicated in the sample sent to you, and as yet have been unable to get a uniform thickness of the two metals. We understand that this problem has been solved satisfactorily by some foundries and we will appreciate any information relative to molding, melting and pouring temperatures as we are anxious to solve the problem.

The casting submitted apparently is a section from what is known as a wedge for a locomotive and is similar in shape to a channel iron. Examination of the specimen leads to the opinion that the brass was poured into the mold while the gray iron, forming the major part of the wedge, was in the molten condition, as it has penetrated in or rather down to a depth of approximately ⅞-inch on one side, and from that point tapers off to a thickness of approximately ⅜-inch at the other side. While an excellent bond is established between the two, the difficulty is as mentioned, non-uniformity of metal thickness, and it is quite possible that in some cases the brass may be extremely thin on the side opposite that from where it is poured into the casting.

As far as we know, pouring brass onto gray iron or steel usually is performed after the iron has been removed from the mold and its upper surface carefully cleaned to insure freedom from scale, dirt, oil. It is essential that the surface against which the brass is to be poured, is absolutely clean, otherwise blowholes and other difficulties will be encountered.

In practice, the cleaned casting is placed in the mold, heating it if possible before doing so, but not heating it to the point where scale is formed. Then a quantity of brass is flowed across the casting surface until it becomes as hot as the brass which by the way, should be poured at a high temperature. Then the flow-off of the brass is stopped and the mold allowed to fill to the proper height.

Desires Addition of Alloy To Stamping Block

We are located in South Africa, and would like to have some information on cast stamping blocks. Will you give me the particulars of the proportions of nickel to cast iron, the grade and the analysis of the iron, etc? The latter is desired because we are doubtful if the combination of nickel to your iron will be the same as that for the South African product.

Stamping blocks or die blocks as they are termed in this country as made at the present time contain both nickel and chromium. Nickel content ranges between 1.50 and 6.0 per cent and the chromium between 0.25 and 2.0 per cent. The usual remaining elements are silicon between 0.60 and 2.00 per cent; manganese between 0.60 and 0.80 per cent; phosphorus, 0.25 per cent maximum, and total carbon between 2.75 to 3.40 per cent. Considerable steel scrap is added to the cupola metal charges and will range between 30 and 60 per cent.

If good quality raw materials are charged so that the silicon, manganese, phosphorus, etc., are suitable for the size of the casting no difficulty will be encountered when allowance is made in the silicon content for the addition of nickel and chromium content. Charcoal pig irons and naturally alloyed pig irons are used in many foundries to obtain the desired physical properties.

Without any data on the size of the die blocks and their application, it will be difficult to make any definite suggestions on composition except as follows: Light forming and stamping dies—1.50 per cent silicon; 0.60 per cent chromium; 2.75 per cent nickel; 0.60 per cent manganese, and 3.30 per cent total carbon. Amount of steel scrap used, 20 to 50 per cent. Dies are oil quenched from 1575 to 1600 degrees Fahr., and drawn at 800 to 1100 degrees Fahr. Heavy forming and stamping dies—1.25 per cent silicon; 0.80 per cent chromium; 2.75 per cent nickel; 0.60 per cent manganese, and 3.00 per cent total carbon. Amount of steel scrap used 40 to 70 per cent. Dies are oil quenched from 1550 to 1575 degrees Fahr., and then the castings are drawn at 800 to 1100 degrees Fahr.

Careful Pouring Required for Manganese Bronze

We are casting some large balance wheels from 3 to 6 feet in diameter, hub 17 inches diameter and 8 inches high. We have lost a few of these wheels due to cracked spokes. Can you advise us how to overcome this difficulty?

Manganese bronze is a peculiar metal in that even a slight agitation produces a dross. In some instances this dross may float to the top of the casting, while in other instances it may stick to the mold or core wall and only show up when the casting is machined. The agitation in the metal may be due to one of two causes. Possibly it may be due to both. In the first the metal may be poured too swiftly and driven against the core where it recoils. In the second the core, either green or dry sand, may not be sufficiently permeable for the rapid escape of the vent. This will set up an agitation in the metal with the consequent formation of dross.

You can determine this point by pouring a few molds without a cope and watching the metal as it rises. In fact unless the customer objects to a slightly uneven surface on top of the ring, the open mold is the best for bushing castings. While one man pours the metal into a small basin near the top edge, a second man looks down into the mold and with a ¼-inch rod dislodges any small dross formations that show a tendency to stick to the core or mold. If a cope is mandatory, the best form of gate is a gate set at a tangent at the bottom. This will introduce the metal quietly and also give it a whirling motion that will help to float any foreign material to the top.

Casting To Be Polished Has Pinholes on Drag Face

We are forwarding a small plate casting approximately 6 inches square, 1-inch thick, machined on both sides and showing a few gas holes on one side and with small holes on the opposite side over nearly the entire surface. Other castings poured from the same heat were perfect, and therefore, apparently the melting method is not responsible. Can you explain the reason for this defect.

The defect is caused by a small jet of steam or gas which would be eliminated in a thicker casting. In this thin casting a film of metal forms around the jet almost instantly. The defect may be caused by steam from sand that is a little wetter than necessary, but more probably it is due to small particles of combustible or explosive material in the sand or the facing material. This point readily may be determined by making one or two castings in another grade of sand. A close chemical and microscopic examination of a sand sample probably will reveal the presence of the gas producing particles.

Core Oven Design Requires Skill

We are contemplating the erection of a new core oven 8 x 8 x 18 feet and would like to have your opinion on the general features of construction. Is an underground firing chamber preferable to others?

As an experienced foundryman of course you are aware that molds and cores may be dried in any type of chamber in which the temperature can be raised to 400 or 500 degrees Fahr. Practically any type of fuel may be used and the heat may enter the oven from the end, the sides, the top or the bottom. The only point in which modern foundrymen are interested is how to secure a uniform temperature in all parts of the oven with a minimum consumption of fuel.

As might be expected the various companies which build ovens have investigated this feature to a greater extent than the operating men in the foundry. Ovens for various purposes operate under different conditions and only an experienced oven builder can make a proper investigation and then design an oven to operate at maximum efficiency and at minimum cost under any given set of conditions. Our suggestion is that you take the problem up with the specialists in this line whose names and addresses are listed in the advertising pages of THE FOUNDRY.

Oil Fired Furnaces Melt Gray Iron

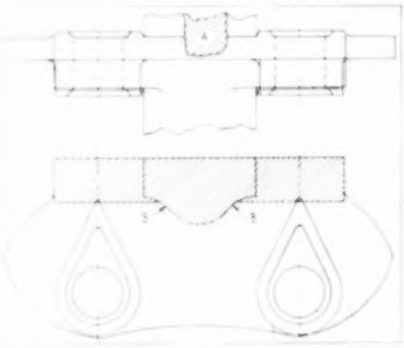
Is there any practical way of using oil to melt small amounts of gray iron, say 1 ton or more? Oil is cheap and plentiful in this district, far removed from any source of coke supply.

Up to the present we believe no satisfactory method has been developed for melting gray iron with oil in the cupola, but several other types of furnaces are available in which oil is employed as a fuel for this purpose. A special type burner mixes the air and oil in proper proportion to produce the necessary temperature in the furnace. Names and addresses of furnace makers may be found in the advertising section of THE FOUNDRY.

Iron can be melted in crucibles where the furnace is equipped with a burner capable of developing a temperature of approximately 2700 degrees Fahr., inside the furnace. We are not familiar with any instance where batches of iron as small as 1 ton are melted in the air furnace, but oil is used as a fuel in several large furnaces of this type, and we see no serious reason why a small furnace could not be adapted for the purpose. The May, 1935 issue of THE FOUNDRY contains an account of a ½-ton open hearth furnace successfully employed for melting alloy steel where of course the temperature has to be considerably higher than in any furnace melting gray iron.

Grate Bars Shrink In the Center

We are enclosing sketch of grate bar castings which show exorbitant shrinkage at points marked *A* and *B*. The castings are poured



Castings shrink in the center at points marked A and B

from a mixture containing steel scrap 14.8 per cent, bessemer pig iron 29.6 per cent, scrap iron 54.00 per cent, nickel and chromium 1.4 per cent. We shall appreciate your advice on how to prevent this shrinkage.

Composition of the iron, containing such a large percentage of scrap, that is scrap made up in all probability largely of shop returns of the same composition, will cause these castings to shrink more than usual. Two alternative methods are open to compensate for this shrinkage. One is to use an extra large gate and if necessary a feeding riser on top of the heavy section. The other is to place internal chills in the mold, as in steel foundry practice. The chills may be either large head nails, or single pieces of metal, either steel or cast iron. You readily can cast a number of these pieces with a nail projecting from one side to be inserted either in the cope or drag face of the mold. The internal chill will not affect the usefulness of the casting, but it will reduce the volume of molten metal at that particular point, and hence reduce or prevent the tendency to shrink.

Iron Boils From Steel Spokes

We are forwarding for your inspection several pieces from the cast iron hub of a small wheel in which steel spokes are cast. The metal is completely honeycombed. We shall appreciate your opinion on the cause and the remedy for this form of defect.

The porous metal in the hub of the wheel is caused either by gas or steam or probably a combination of both. A possibility exists that hard or wet cores forming the hub may be responsible, or at least partly responsible for the trouble. However, the main cause is the condition of the ends of the steel spokes which project into the hub cavity. They are either damp or rusty or perhaps both.

Rust (iron oxide) suddenly raised to a high temperature is as explosive as dynamite. Even a thin film of oxide will cause the molten iron in the vicinity to boil violently. Some of the gas escapes, but a certain amount remains trapped in the metal. Obviously the remedy for gas holes in the casting is to clean the ends of the spokes either by sandblasting or grinding before they are placed in the mold. Obviously also the castings should be poured as soon as possible after the molds are closed, since an oxide film commences to form on spokes almost immediately. Where the molds remain on the floor for several hours a riser should be placed on top and a small quantity of metal *flowed* through to carry away any bubbles incident to a slight disturbance.

Encounters Trouble With Bushings

We have been trying to cast chill phosphor-bronze bushings 2-inches in diameter and 3 feet long. The molds are made of cast iron and supplied by a firm experienced in the production of such molds. We have cast the bushings in molds at a temperature of 140 degrees Cent. (284 degrees Fahr.), and at all temperatures between that and the hottest possible, that is to say, casting one, emptying the molds and immediately recasting. We have tried smoking the molds, dressing them with lard oil, whale oil, lard oil and charcoal, whale oil and charcoal, whale oil and rosin, with and without a shake of plumbago and flour. We have cast these vertically and at varying angles, cast open, with heads, without heads (that is, with runner cups), and not one perfect bushing has been obtained. We have tried all temperatures of castings, but either we get blowholes or soot or both.

Since many nonferrous castings are made in metal molds without any great difficulty, it is rather hard to determine why you have trouble in obtaining solid bushings. Sooting as you term it, undoubtedly is caused by improper mold coating materials or getting it on too thick, or both. We are not familiar with the properties of lard and whale oils, but it occurs to us that possibly they break down too rapidly under comparatively low temperature conditions, and hence are not suitable for the purpose. Our suggestion would be a mineral oil such as paraffine lubricating oil mixed with a little lampblack or graphite. Apply just as light a coating as is possible to the mold. Spraying it on would be the ideal way, but with a small solid mold, a swab probably will have to be used. In that case, the swab should be just moist enough to apply a thin coat to the mold.

While you mention the use of a mold dressing, we wonder if you have tried making the castings without any dressing on the mold at all to see what results are obtained. That, of course, would eliminate any possibility of sooting. Although mention is made of blowholes, it is difficult to determine whether they really are caused by gases generated when the molten metal strikes the mold, or whether they are caused by gases absorbed during the melting period, and which of course, are due to reducing conditions in the furnace.

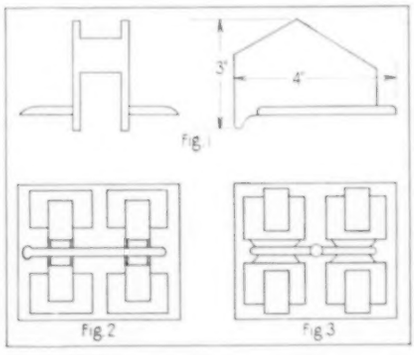
One way to find out whether the metal is being gassed in the furnace would be to pour some of the metal into a sand mold, and observe whether or not the sand casting contains similar holes. If that is the case, the melting conditions should be changed so that a neutral or slightly oxidizing atmosphere is maintained in the furnace. Also the metal should be melted as fast and as hot as possible. Pouring temperature of the metal will depend upon the content of the phosphorus; the higher the phosphorus, the lower the pouring temperature.

For example, in the 80 per cent copper, 10 per cent tin and 10 per cent lead alloy, the pouring temperature for sand molds, where the alloy contains from a trace to 0.02 per cent will be 1900 to 2050 degrees Fahr.; with phosphorus ranging from 0.10 to 0.20 per cent, the temperature will range from 1840 to 1900 degrees Fahr. while with from 0.50 to 1.0 per cent phosphorus, the pouring temperature will range from 1500 to 1680 degrees Fahr. With metal molds, the pouring temperature usually is 75 to 100 degrees Fahr. higher than for sand molds.

As far as we can ascertain your heating of the molds to 140 degrees Cent. should be satisfactory although in this country the molds usually are put into operation after they have reached a temperature of 250 degrees Fahr. or about 121 degrees Cent. Also, to obtain a long full life, the mold temperature should be kept under 800 degrees Fahr.

Rat Tails Appear on Brass Castings

We are making small brass castings four on a gate as shown in the accompanying sketch but are having trouble on account of rat tails on the flat surfaces. We have tried both No. 0 and No. 1 Albany sand for the molds. Usual composition of the metal is 70 per cent copper, 28 per cent zinc, 1 per cent lead and 1 per cent tin. We have varied this mixture on occasion and have added a small amount of aluminum. The metal is melted in No. 60 crucibles with oil or coke and we have poured the metal at various temperatures as determined by pyrometer, but still the rat tails persist.



Sketch shows method of rearranging patterns

Based merely on the evidence submitted in your letter we are inclined to the opinion that the rat tails on the cope surface of the castings are incipient cold shuts caused by metal which fills the mold too slowly. The sketch Fig. 2, shows two narrow gates connecting each casting to the central runner. Molten metal under all conditions develops a slight surface film and this film separates adjacent streams when they meet. Where the casting section is thick the two streams merge fully with no mark on the surface to indicate the junction. With colder metal or thinner section the junction line remains in evidence. A suggested remedy is to rearrange the patterns as in Fig. 3, on the gate so that the metal may enter each mold much more rapidly through a single wide, thin gate. The sand you are using is suitable for the class of casting and the presence or absence of aluminum is not a factor of any importance.

Aluminum Must Have Lustrous Finish

We are up against a problem we cannot solve. We make a small aluminum casting that has to have a lustrous finish. It is a snap for raincoats. We are tumbling them at present in acid and water solution but they come out dark and dull. Can you give us a formula to follow in polishing these snaps to a permanent lustrous finish with the aid of a tumbling barrel?

A smooth lustrous surface may be obtained on small work by burnishing in a rotating barrel using small steel balls and a soap solution as the lubricant. However, in that operation, the work first must be cleaned so that it has the desired color, as the burnishing operation does not have any cleaning effect. Consequently, before proceeding with burnishing, it will be necessary to obtain the desired white or nearly white surface on your castings.

To obtain such a surface, it is suggested that you dip the castings in a hot strong caustic soda solution containing 1 to 2 pounds of caustic soda per gallon of water. The solution is heated to 180 degrees Fahr. and the castings are immersed until a uniform blackening of the surface takes place. Then the castings are rinsed thoroughly in water, and after that operation, are dipped in a strong acid mixture containing 3 parts of concentrated nitric acid and 1 part concentrated hydrochloric acid. That mixture is held at room temperature; the castings are permitted to remain in the solution until the black smudge is removed and the castings assume a white frosted finish.

Then the castings are rinsed thoroughly and placed in the burnishing barrel using small steel balls ⅛-inch to ¼-inch in diameter to supply the necessary rubbing and polishing agent. The ratio of balls to work may be 2 to 1 or 1 to 1. The barrel should rotate at low speed. A 10 to 12 inch diameter barrel should rotate between 25 to 60 revolutions per minute; a 16-inch barrel, 20 to 35 revolutions per minute; and a 24 to 30 inch barrel from 10 to 12 revolutions per minute. Small barrels usually are completely filled with the mixture of balls and work while the large ones usually are 2/3 to 4/5 full. The lubricant employed in burnishing is a soap and water solution, and it is advisable to obtain a special soap designed especially for aluminum as ordinary soap tends to discolor the work.

R. C. Heaslett

John A. Moore

L. E. Everett

Fred Grotts

MEN OF INDUSTRY

LEROY EDWARD EVERETT recently has been appointed by the Key Co., East St. Louis, Ill., to build, install and manage its new steel foundry in that city. Mr. Everett was born in 1898 and attended the University of Wisconsin. He started his foundry career in 1921 at the Indiana Harbor works of American Steel Foundries, as a special apprentice. In 1925 he went to the Nugent Steel Castings Co., Chicago, as research engineer. Two years later Mr. Everett was appointed foundry engineer by the Illinois Clay Products Co. In 1931 he went to the Stockham Pipe Fittings Co., Birmingham, as superintendent of the steel foundry. He went to Los Angeles as superintendent of the Warman Steel Castings Co. in 1933 and a year later returned to the Stockham company in the same capacity. Mr. Everett is a member of the American Foundrymen's association and the American Society for Metals. He was active in forming the Birmingham chapter of the A.F.A. and was chairman of the A.F.A. subcommittee on electric furnace refractories of the joint committee on foundry refractories from 1928-30.

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JOHN A. MOORE, formerly superintendent of the Michigan Valve & Foundry Co. division of the Timken-Detroit Axle Co., Detroit, has been made foundry superintendent of Willsea Works Inc., Rochester, N. Y. Mr. Moore was born in Ottumwa, Iowa, in 1878 and completed his apprenticeship with the Fulton Foundry & Machine Co., Cleveland, in 1899. He then spent 5 years in the molding departments of various foundries throughout the United States and in 1904 was made foundry superintendent, Oliver Mfg. Co., Knoxville, Tenn. In 1911 he became connected in the same capacity with the American Blower Co., Detroit. From 1913 to 1918 Mr. Moore was connected with the Russell Wheel & Foundry Co., Detroit, from 1918 to 1919 with the American Blower Co. and from 1919 to 1922 again with the Russell company. Mr. Moore was engaged in foundry consultation work for the next 5 years. In 1927 he was made manager of the Acme Foundry Co., Detroit. After his resignation from that company in 1932, he was affiliated with the Michigan Valve company for 3 years.

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FRED GROTTS, associated for the past 7 years with the Continental Roll & Steel Foundry Co., Chicago, has been appointed vice president and technical advisor of the Lebanon Steel Foundry Co., Lebanon, Pa. Mr. Grotts attended the Universities of Illinois and Missouri, graduating from the latter with a degree of bachelor of science in metallurgy and a masters degree in metallurgical engineering. Mr. Grotts has been affiliated with the Curtis Aeroplane & Motor Corp., Buffalo; Caterpillar Tractor Co., Peoria, Ill.; and American Steel Foundries, Granite City, Ill. While with the Continental company he was metallurgical director of its three divisions: Hubbard Steel Foundry Co., East Chicago, Ind.; Wheeling Mold & Foundry Co., Wheeling, W. Va.; and the Duquesne Steel Foundry Co., Coraopolis, Pa.

R. C. HEASLETT, metallurgical engineer for the Eastern division of the Continental company, has been made director of metallurgy of that company, succeeding Mr. Grotts. Specializing in chemistry, he graduated from Ohio State university and became assistant chemist for the Follansbee Bros. Co., Follansbee, W. Va. Mr. Heaslett became successively chief chemist and metallurgist of the Wheeling Mold & Foundry Co., Wheeling, W. Va. Following this he was appointed metallurgist for the Continental Roll & Steel Foundry Co. He is a member of the American Society for Testing Materials, the British Iron and Steel institute, American Society for Metals and the Pittsburgh Foundrymen's association.

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GEORGE E. PICKUP has resigned as vice president and general manager of the Florence-Wehrle Stove Co., Newark, O., and will establish his own laboratory. Mr. Pickup served his apprenticeship as wood and metal patternmaker and early in his business career advanced from the position of pattern foreman to assistant superintendent of the Adams Co., Dubuque, Iowa. He was associated with that company for 17 years, representing it in many foundries of the United States. For 3 years of this time he was working in six European countries. Mr. Pickup was foundry superintendent of the Wehrle Co. for over 30 years prior to March, 1936, when it was taken over by the Florence-Wehrle company. Recently Mr. Pickup has been on a West Indies cruise.

(Continued on page 68)

TRULINE BINDER

Reg. U. S. Pat. Off. by Hercules Powder Company

used wherever metals are cast

AT Hercules Experiment Station there is a completely equipped laboratory where work on Truline Binder is being done constantly. Here cores made with Truline have been tested under many conditions, and this research, together with practical work at foundries, has resulted in the development of a powdered dry bond binder that will help you to produce any type of core you use at a substantial saving in cost.

Truline Binder has many valuable properties, and we should like to send you a sample for test purposes.

Your letter will bring a sample and further interesting information.

JJ-9

HERCULES NAVAL STORES

HERCULES POWDER COMPANY

INCORPORATED

999 Market Street, Wilmington, Delaware

Branch Offices: Chicago, New York, St. Louis
Salt Lake City, San Francisco

(*Continued from page* 66)

HUGO MARQUETTE has been appointed production manager of the Smith Steel Foundry Co., Milwaukee. He was born in Wisconsin and until 1916 was affiliated with the Chicago & Northwestern Railway Co. In that year he became connected with the Smith company, working for 2 years in its machine shop at Merrill, Wis. Mr. Marquette's work has been principally centered on production although for some time he was affiliated with the sales department of the Smith Company.

ADOLPH PETERS has been appointed metallurgist of the company. He was born in Milwaukee and attended the University of Wisconsin, securing his bachelor of science degree in chemical engineering in 1933, and his master of science degree in metallurgy in 1935. During his college years Mr. Peters worked in various heat treating plants and, later at a local steel foundry, for 19 months in the laboratory and 8 months in the shop training course. He has been with the Smith company for 2 years.

Adolph Peters

Hugo Marquette

Wm. J. Metzger

W. L. Weaver

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DONALD D. HAY has been elected president of the Cascade Foundry Co., Erie, Pa. The following officers also were elected: HENRY ENGEL, general manager; FLORENCE HAY THAYER, treasurer; and S. Y. ROSSITER, secretary. Mr. Hay is a son of the former president of the company.

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JOHN M. SCHREINER has been appointed manager of the Detroit branch of the Black & Decker Mfg. Co., Towson, Md., succeeding the late GEORGE W. STOIBER. Mr. Schreiner has been active in the Detroit area for the past 12 years. WILLIAM J. FENWICK, for the past several years co-manager of the Cleveland branch, has been appointed manager of all its activities. G. H. TRESLAR has been appointed supervisor of the Detroit and Cleveland territories.

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WILLIAM J. METZGER has been appointed foundry foreman of the Leroy Plow Co., Leroy, N. Y. Mr. Metzger is a graduate of McLain's System Inc., Milwaukee, and started his apprenticeship in 1915 at the Caledonia Bean Harvester Works, Caledonia, N. Y. He completed his apprenticeship in the foundry of the Wiard Plow Co., Batavia, N. Y., and then worked in various foundries as a molder. In 1928 he became connected with the gray iron foundry of Massey Harris Co., Batavia, and in 1936 returned to the Wiard company.

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FRED B. GRATTON has resigned as foreman of the foundries of the A. J. Deer and Royal Electric Companies in Hornell, N. Y., to become general superintendent of the foundry of the Popec Machine Co., Shortsville, N. Y.

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EDWARD A. BACON has become president and treasurer of the George H. Smith Casting Co., Milwaukee, which he recently purchased. Other officers are W. J. DONNELLY, secretary, and P. W. KAUFMANN, controller. The company was founded in 1896 by George H. Smith, and is regarded as the oldest existing steel foundry in Wisconsin.

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H. P. MEE, vice president of the Caterpillar Tractor Co., Peoria, Ill., has resigned effective June 1. Mr. Mee joined the C. L. Best Co., predecessor of the Caterpillar company, 17 years ago as credit manager. When the Best and Holt companies merged, he became successively treasurer, secretary-treasurer, and later vice president and treasurer. In 1934 he was appointed vice president in charge of sales and two years later was advanced to his recent administrative position. Mr. Mee will make his home in Santa Barbara, Calif.

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WILLIAM L. WEAVER, associated with Ludlum Steel Co., Watervliet, N. Y., since 1920, for the past few years as special representative, has been appointed manager of stainless steel castings sales. D. M. SCOTT has been placed in charge of stainless foundry operations at Buffalo where the Ludlum company's stainless steel castings are being produced.

• • •

WESLEY LAMBERT, well known nonferrous metallurgist in England and for many years manager of the metallurgical department of J. Stone & Co., Ltd., Deptford and Charlton, England, has been elected an honorary member of the Institute of British Foundry. Mr. Lambert was elected president of the institute in 1929 and presided over the International Foundry conference which was held in Great Britain that year and was attended by a large delegation from the United States. He received his technical training at King's college, where he was given the Jelf medal and the Cunningham prize. In 1890 he was appointed assistant metallurgist at the Royal Gun Factories, Woolwich, England, and later was made chief metallur-

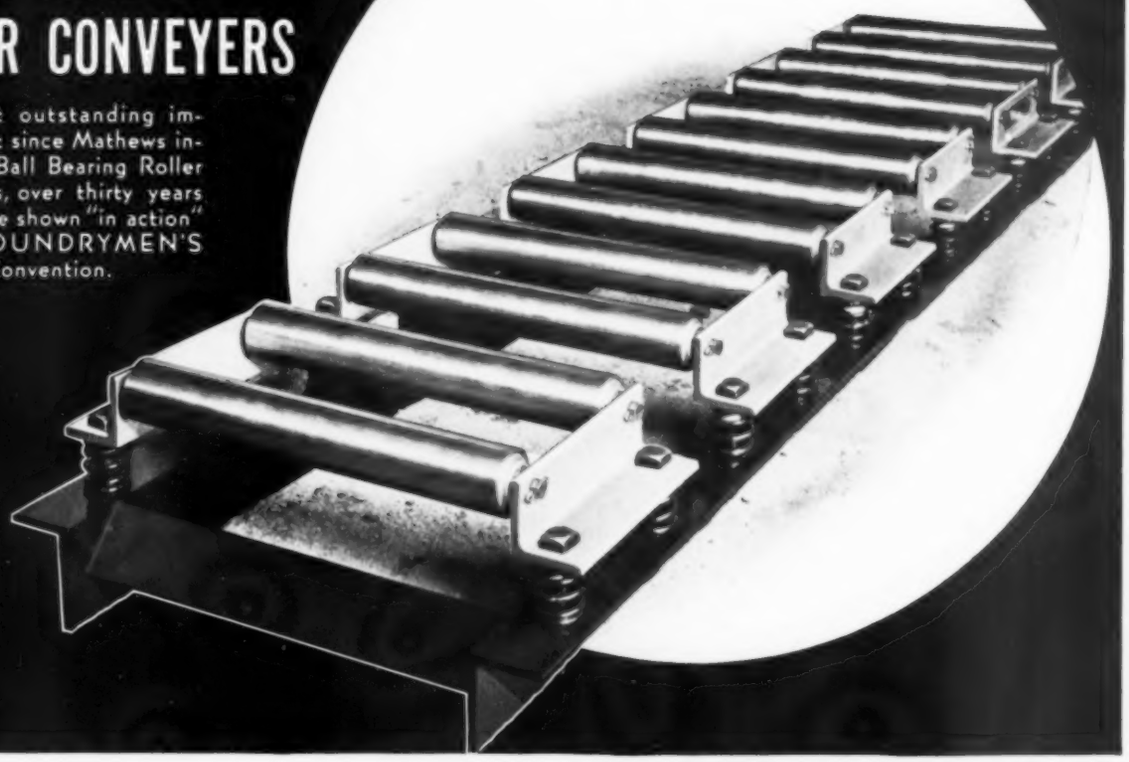
(*Concluded on page* 70)

BIG NEWS

FOR USERS OF

ROLLER CONVEYERS

The most outstanding improvement since Mathews introduced Ball Bearing Roller Conveyers, over thirty years ago, will be shown "in action" at the FOUNDRYMEN'S Convention.



SHOCK-ABSORBING
ROLLER CONVEYERS

FIRST PUBLIC SHOWING AT THE FOUNDRY CONVENTION MILWAUKEE MAY 3-7, 1937

Tests under actual practice in one of America's largest Steel Foundries, for over six months, prove these conveyers: lower maintenance costs . . . prevent damage to Rollers and Bearings due to load impact . . . distribute load weight evenly regardless of irregular riding surfaces . . . and generally increase the efficiency of Conveyer Systems.

U. S. Patents Issued

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Canadian Factory
Mathews Conveyer Co., Ltd., Port Hope, Ontario

Pacific Coast Factory
Mailler Searles, Inc., San Francisco, Calif.

(*Concluded from page 68*)

gist. For several years he acted as special lecturer to the Sir John Cass Technical institute (University of London) and his connection therewith is commemorated by the gift of a medal bearing his name. Mr. Lambert is a life fellow of the Chemical society and was created Commander of the Order of the British Empire in January, 1931.

♦ ♦ ♦

H. E. BECKMAN has been elected president of the Springfield Facing

H. E. Beckman

Co., Springfield, Mass., and Newark, N. J., to succeed the late L. S. Brown, founder of the company in 1882 and president until his death last January. Mr. Beckman has been affiliated with the foundry supply field for many years and since 1928 has been general manager of the company. He was born in Cincinnati and was graduated from Sheffield Scientific school, Yale university, New Haven, Conn., in 1911. He later studied at the Massachusetts Institute of Technology, Cambridge, Mass. Since that time, except for 2 years in the army during the World war, he has been identified with the foundry industry.

HAROLD J. DORUS has resigned as superintendent of foundries, Yale & Towne Mfg. Co., Stamford, Conn., to become general manager of the Springfield Facing Co., with headquarters in Springfield. Mr. Dorus was born in Bridgeport, Conn., and studied at Queens college, Kingston, Ontario. He has been affiliated with Yale & Towne since 1919, at which time he was made assistant superintendent of foundries, later in 1923 to be advanced to the superintendency. In this capacity he directed operations in gray iron, malleable, steel and various nonferrous metals.

♦ ♦ ♦

BERNARD E. SUNNY, Chicago, and JAMES S. WATSON, Indianapolis, have been elected directors of the Link-Belt Co., Chicago, to succeed ARTHUR L. LIVERMORE, deceased, and AUSTIN L. ADAMS, resigned. Mr. Sunny is a director of several companies, including General Electric Co. and Illinois Bell Telephone Co. Mr. Watson is vice president in charge of Indianapolis plant operations of the Link-Belt Co., having served that company continuously for 44 years. Re-elected directors are STAUNTON B. PECK, Chestnut Hill, Pa., and HARRIS WHITTMORE JR., Naugatuck, Conn. The new directors have been elected to serve until 1941.

♦ ♦ ♦

L. W. MOORE, managing director of Cie Crane, Paris, France, and former correspondent in Paris of THE FOUNDRY has had the order of Chevalier of the Legion of Honor conferred upon him by the French government. After having completed his education, Mr. Moore did some prospecting for gold in Alaska and the Yukon in 1915 and 1916. When America entered the war, he went to France and distinguished himself in the air service. He was associated with the Penton Publishing Co. as French correspondent in the years 1924 to 1926, after which he joined the Crane company's offices in Paris. He is now managing director of the French company.

♦ ♦ ♦

ED BUMKE recently has been appointed superintendent of the malleable division, Oliver Farm Equipment Co., South Bend, Ind. Mr. Bumke graduated from the University of Michigan in 1925 and became connected with Deere & Co., at the Union Malleable Iron Works as a molder. Later he headed the time study department and following that was master mechanic. He then entered the employ of Emerson Brantingham, Rockford, Ill., as assistant foundry superintendent. Mr. Bumke was foundry engineer of the Oliver Farm Equipment Co. prior to his recent advancement.

♦ ♦ ♦

J. G. EBERHARDT, formerly connected with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and Sivyer Steel Castings Co., Milwaukee, has been made assistant foundry superintendent of the Kay-Brunner Steel Products Inc., Los Angeles.

♦ ♦ ♦

D. W. MACDONALD has been elected to the board of the Erie Foundry Co., Erie, Pa., to fill the vacancy caused by the death of JOHN R. MACDONALD. L. F. WALKER has been elected assistant secretary, C. D. PINNEY, assistant treasurer, and D. A. CURRIE, in addition to his duties as president and general manager, has been elected treasurer.

♦ ♦ ♦

FRANK DAY, E. J. RAMALEY and HOWARD L. WOMOCHEL have been appointed to the technical staff of Battelle Memorial institute, Columbus, O. Mr. Day is a graduate of Ohio State university and has been assigned to a project in chemical engineering. Mr. Ramaley received a degree of master of science in electrical engineering from the University of Colorado and has been assigned to a research project dealing

Harold J. Dorus

with the magnetic properties of alloys. Mr. Womochel is a graduate in metallurgy of the University of Wisconsin and was connected formerly with the Burgess Parr Co. He has been assigned to the metallurgical division at the institute.

♦ ♦ ♦

HOWARD CREPS has been made a member of the sales department, Frank Foundries Corp., Moline, Ill. and Davenport, Iowa. Mr. Creps was connected with the Gale Mfg. Co., Albion, Mich. since 1927.

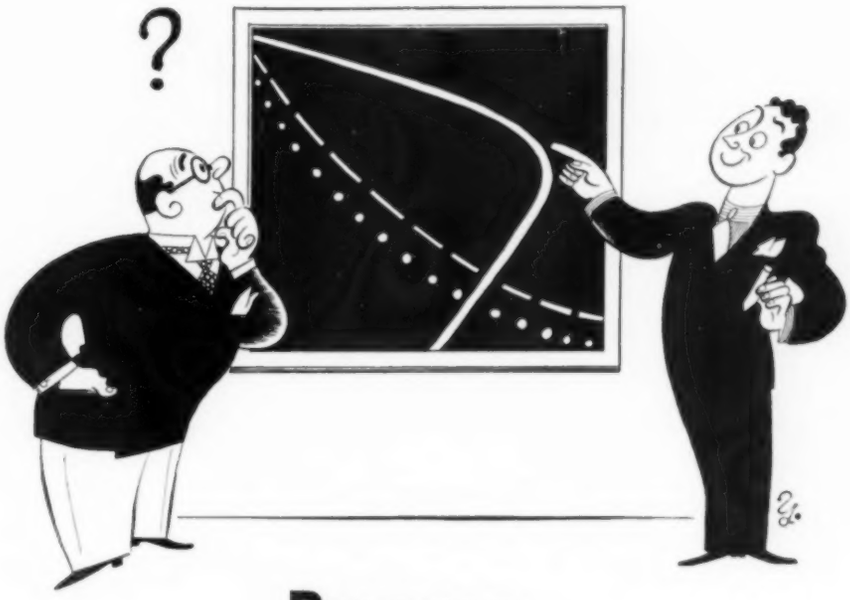
♦ ♦ ♦

J. B. TROTMAN, for many years associated with the Goulds Pumps Inc., has been appointed manager of the T pump division of Roots-Connersville Blower Corp., Connersville,

♦ ♦ ♦

J. P. MORRISSEY has been appointed head of the weld rod sales division of the Harnischfeger Corp., Milwaukee. In 1930 he was technical welding advisor for the Russian government, appointed by the Amtorg Co., New York. Mr. Morrissey's former connections include 6 years as special representative on well rods for the Crucible Steel Co. of America and for some time Philadelphia district manager of the Fusion Welding Corp.

Why WILL HIGH CYCLE TOOLS REDUCE MY PRODUCTION COSTS ?



Because THEY DON'T SLOW DOWN UNDER HEAVY LOADS

SPEED maintained—torque maintained—under loads that make other tools slow down to a walk; that's the big cost-cutting feature of High Cycle. High Cycle Tools register only a 20% decrease in speed between no-load and stall points, which compares with a decrease up to 60% for Universal and Pneumatic Tools.

Translate this extra speed and extra power into terms of increased per-man production—particularly on tough nut running, stud setting, drilling, sanding and grinding jobs. Add to it High Cycle's low power cost and low maintenance cost both on tools and power supply system. You'll readily see why manufacturers in fields where rapid, low-cost production is essential are swinging to Black & Decker-Van Dorn High Cycle Tools.

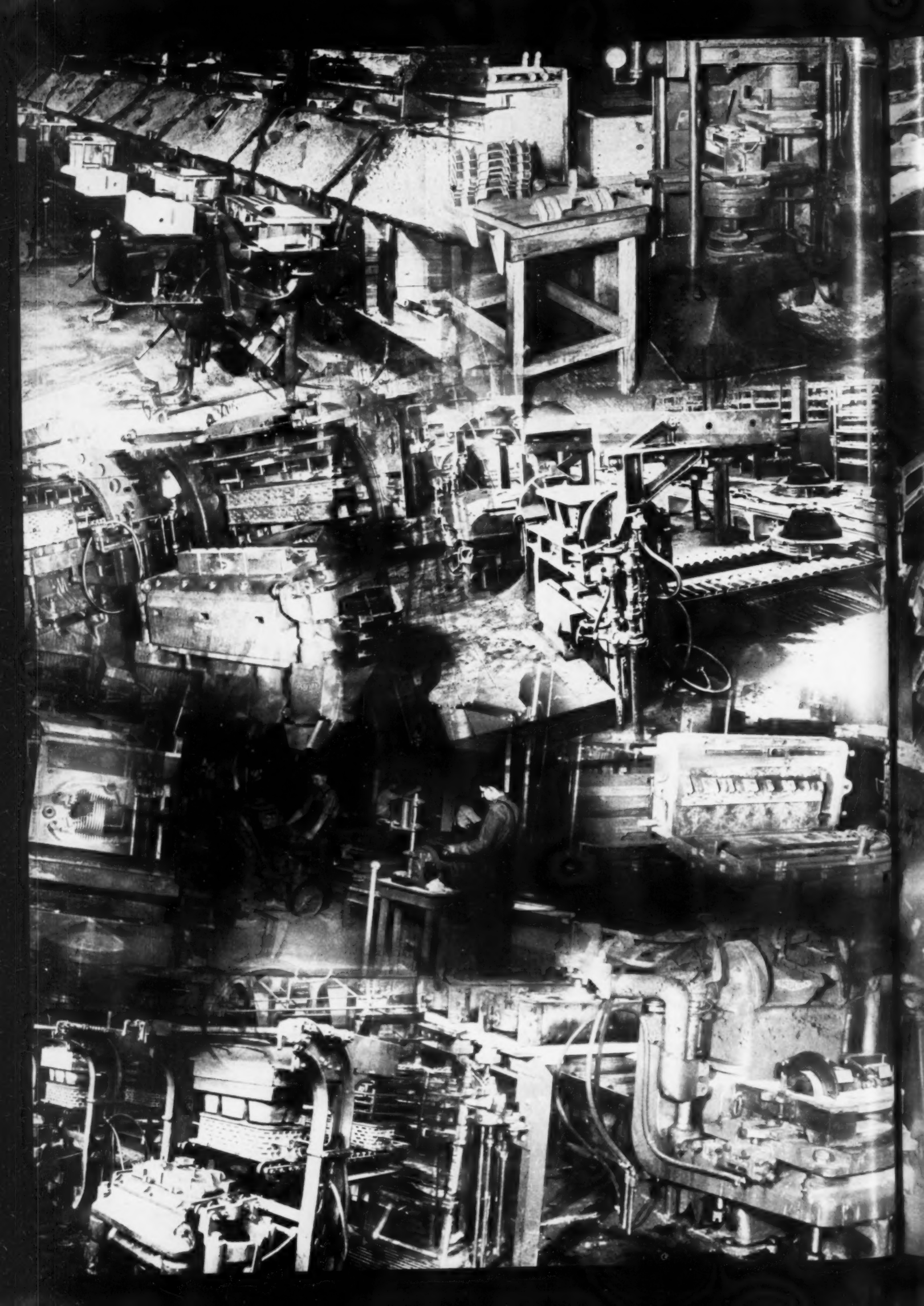
HOW MUCH WILL HIGH CYCLE TOOLS SAVE FOR ME?

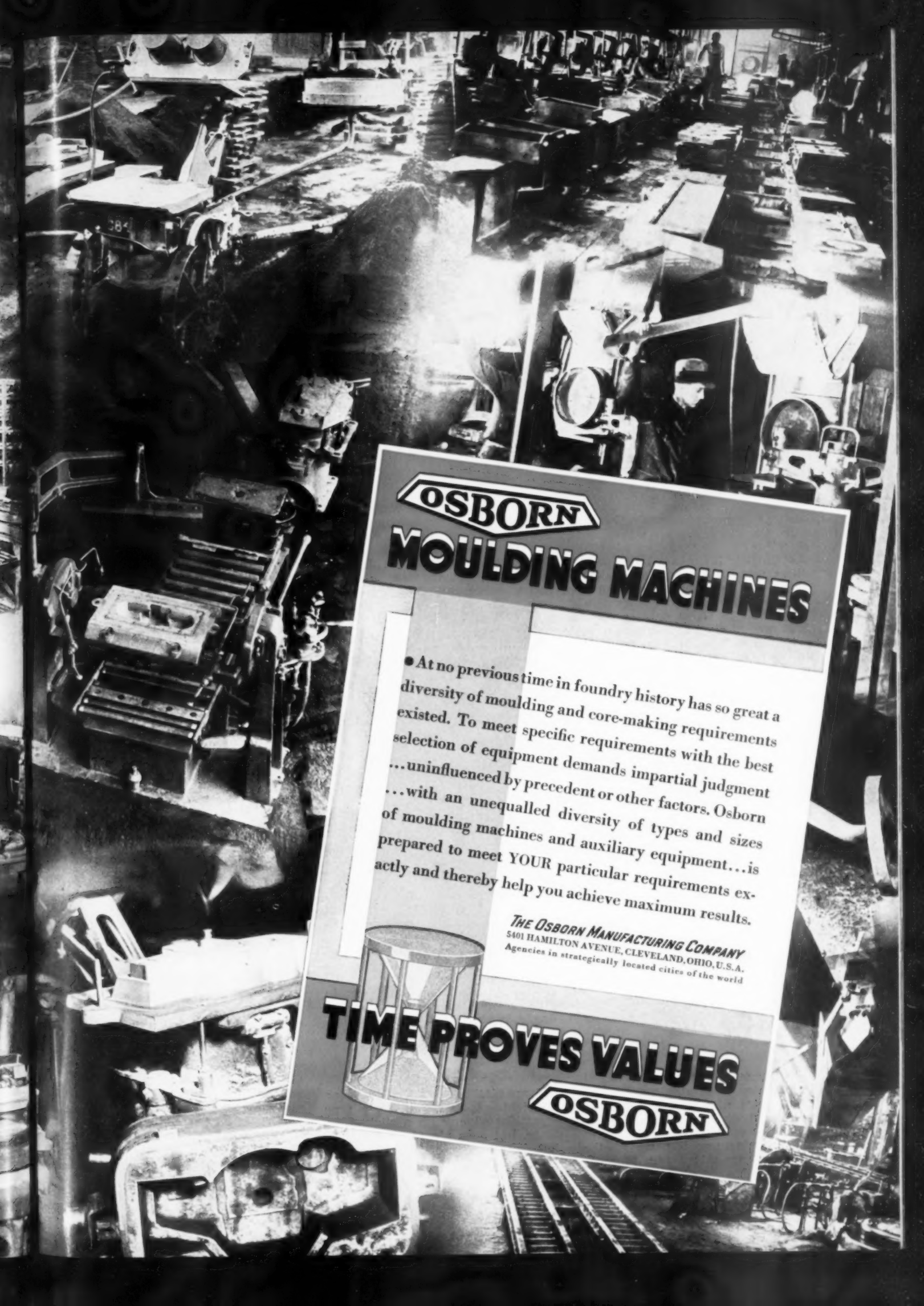
It's easy to find out definitely. Our High Cycle Engineers will be glad to study your production operations and give you an accurate report—without obligation on your part. For further information and catalog, write: High Cycle Division, Black & Decker-Van Dorn, 742 Pennsylvania Avenue, Towson, Md.

BLACK & DECKER-VAN DORN High Cycle TOOLS

DRILLS REAMERS SCREW DRIVERS NUT RUNNERS TAPPERS STUD SETTERS SANDERS GRINDERS DIE GRINDERS

See Black & Decker—Van Dorn High Cycle Tools Demonstrated at the Foundry Show, Booths 3 and 4, Mechanics Hall.




OSBORN
MOULDING MACHINES
●At no previous time in foundry history has so great a diversity of moulding and core-making requirements existed. To meet specific requirements with the best selection of equipment demands impartial judgment ...uninfluenced by precedent or other factors. Osborn ...with an unequalled diversity of types and sizes of moulding machines and auxiliary equipment...is prepared to meet YOUR particular requirements exactly and thereby help you achieve maximum results.
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TIME PROVES VALUES
OSBORN

VIEWING FOUNDRY DEVLOPMENTS AT SHORT RANGE

TO OBTAIN a good adherent coat of nickel on aluminum alloy castings, it is necessary that the surface be specially roughened by chemical attack. A good acid dip for that purpose is composed of 3 parts nitric acid (specific gravity, 1.43), and 1 part hydrofluoric acid (48 to 52 per cent) operated at a temperature from 75 to 80 degrees Fahr. Best time of dipping will have to be determined by experiment from the following: Die castings, 15 to 30 seconds; permanent mold castings, 30 to 90 seconds, and sand castings, 60 to 120 seconds.

• • •

Dutch invention exploited in England is claimed to permit the deposit of a thin coating of chromium on the cylinder walls of diesel engines by electrochemical means. The coating only can be removed chemically, and tests indicate that wear on the walls has been reduced greatly. In the tests standard engines were employed with half of the cylinders coated by the process and the other half were not treated.

• • •

Waterproof plywood can be made by employing a zinc chloride organic adhesive instead of the usual glue. The adhesive, soluble in water when applied, is converted into a form insoluble at ordinary temperatures by the hot press.

• • •

A compound has been developed for addition to paints, lacquer, varnishes, etc., which permits application of those materials to damp, moist or wet surfaces. According to the manufacturer 5 parts of the compound are mixed with 95 parts of the well stirred paint, and the mixture applied to the work with a good brush or by spraying. It is claimed the moisture on the work is absorbed by the compound which then travels to the surface and evaporates, leaving an adherent, homogeneous paint film.

• • •

AN INGENIOUS Australian foundryman has developed a shop kink for using long, loose pins

in closing high molds. Each flask section has two lugs on diametrically opposite sides. The bottom lug on the drag flask is drilled to the exact size of the pin. All other lugs are drilled 1/64-inch larger for easy clearance. The long pin is set in place in the drag and then fastened firmly in place with a wood wedge, as shown in the accompanying illustration.

• • •

Brass plating salt which produces a bright, nontarnishing plate that resembles silver with a slight blue tinge, has been placed on the market. Approximately 0.001-inch can be deposited in 2 hours. Plating solution temperature is between 140 and 175 degrees Fahr., operating voltage between 3 and 8 volts, and current density from 15 to 25 amperes per square foot. The recommended bath is comprised of 1½ ounces of the salt, 2½ ounces of sodium cyanide and 1 gallon of water.

• • •

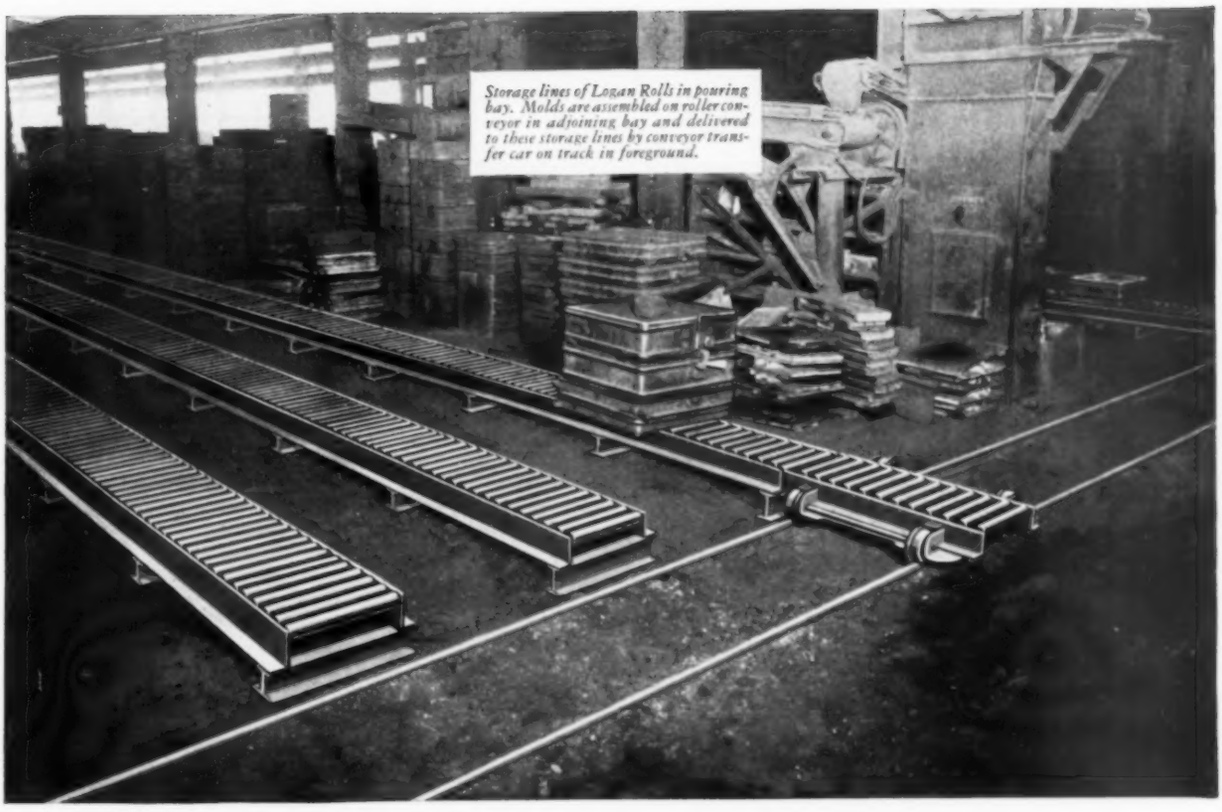
A nonferrous alloy suitable for ornamental castings contains 88 per cent copper, 2 per cent nickel, 2 per cent tin, 2 per cent lead, and 8 per cent zinc. Usually the lead is kept as low as possible without impairing machinability. High lead is detrimental to the production of beautiful oxidized finishes.

• • •

Soldering of copper-silicon alloy castings containing 3.5 to 4.5 per cent silicon, 1 per cent manganese and 95 per cent copper can be accomplished easily if the surface is clean. Cleaning should be done with sodium bichromate-sulphuric acid solution or with hydrochloric (muriatic) acid. Soldering then is performed in the usual manner with zinc chloride flux.

• • •

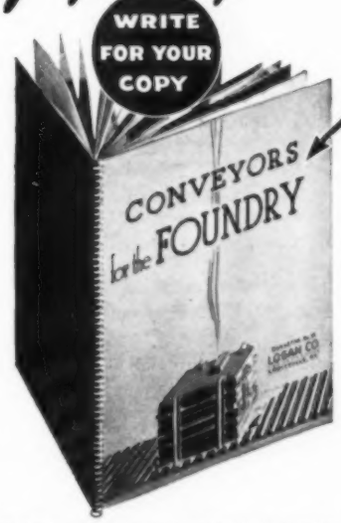
NEWLY developed method for coloring metals comprises plating thin films of copper, cobalt, nickel, iron, molybdenum, chromium or manganese on the surface. Colors obtainable include violet, blue, green, yellow, orange and red. Articles to be colored are cleaned and polished in accordance with usual plating procedure, and made the cathode in the bath. Plating is interrupted when the desired color is reached, and then the work is heated to produce the bright color.



Storage lines of Logan Rolls in pouring bay. Molds are assembled on roller conveyor in adjoining bay and delivered to these storage lines by conveyor transfer car on track in foreground.

A NEW BULLETIN *on an increasingly important subject*

"CONVEYORS for the Foundry" not only has interesting illustrations of modern conveyor systems but also sketches and engineering data which you will want on file. In all probability you will find something in this book that will give you an idea for *your* plant and if you are contemplating conveyors *now*, do not fail to see Logan Bulletin 15 before you act. Or if you expect to use conveyors later, this book should still be on your shelf for ready reference. . . . Logan Conveyors, gravity and power, are profitable equipment for handling flasks through molding, pouring, cooling and storage—castings and tote pans to cleaning, grinding and machining operations. . . The new Logan Foundry Bulletin is ready to be mailed to you. Write today, on your letterhead, for your copy. No obligation.



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580 Buchanan St.

HELP YOU GET OUT THE WORK

Logan Conveyors

LOUISVILLE

Fig. 1 (Left)—Team from Austin high school. Boy at the left is molding the fluke part of the anchor pattern. Fig. 2 (Right)—Boys from Lane Technical school operated the cupola, while each team poured its own molds

Boys Enter Molding Contest

TWENTY-FOUR boys from various Chicago high schools on March 18 took part in a molding contest sponsored by the Illinois Vocational association. These boys were selected representatives of the foundry classes from the Bloom Township high school, Chicago Heights, and from the Chicago schools: Lane Technical, Crane Technical, Carl Schurz, Harrison, Austin, Lindblom and Tilden Technical.

Three boys from each school participated as teams and their competitive work was performed in the magnificently equipped foundry of Lane Technical high school, of which Charles Lang is principal, and Carl Carlson is superintendent of shop work.

Each boy was provided a standard set of patterns for a small boat anchor, in two parts, the fluke and the shaft, from which he made a set of molds. In addition, he made two castings from miscellaneous patterns furnished by his school. These castings were forwarded to Peoria, Ill., where they were judged by a committee of practical foundrymen at the annual meeting of the Illinois Vocational association, March 28. Judging was according to a system of scoring modeled after that used in the apprentice competition of the American Foundrymen's association. Three prizes were provided by the Chicago Chapter of the A.F.A.

Spectators to the contest included delegations from various foundries in the Chicago District; Illinois-Carnegie Steel Corp., the International Harvester Co., American Manganese Steel Co., Crane Co., Greenlee Foundry Co., Western Electric Co., also officers of the American Foundrymen's association and the National Founder's association, in addition to hundreds of students of Lane Technical high school. Representatives of industry present agreed that the quality of workmanship displayed by the boys was excellent, speaking highly of the excellent training they had received from their instructors, who are experienced foundrymen. It was considered that in these boys the foundries of the district had an excellent source of future foundrymen.

Foundry instructors in charge of the work in the various schools include Mr. Manske, Bloom Township high school; Tom Brown, Lane Technical; R. W. Schroeder, Crane Technical; Arthur H. Webb, Carl Schurz high; E. T. McCombe Austin high; J. W. Anderson, Lindblom high; O. A. Johnson, Tilden Technical, and C. N. Ring, Harrison Technical.

Boys from Lane had charge of the cupola operation, while each team poured its own molds.

As a result of the interest aroused on the part of the boys, the instructors have decided to make this contest an annual affair.

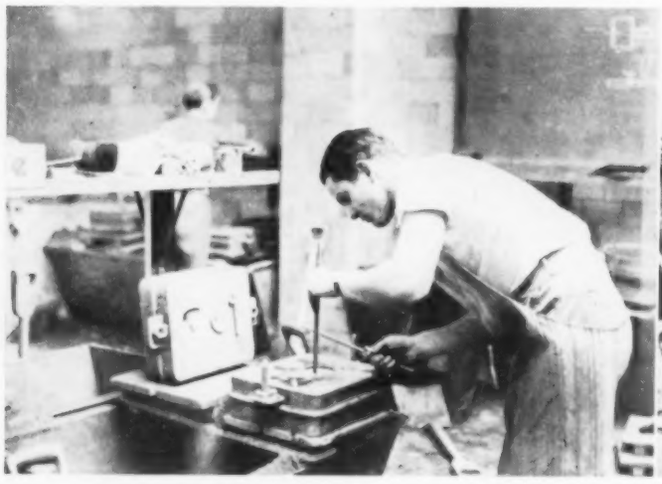
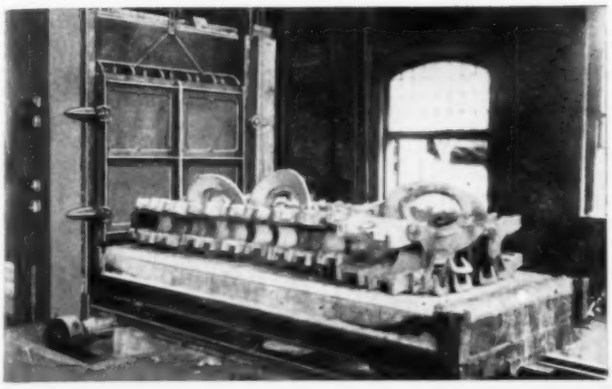
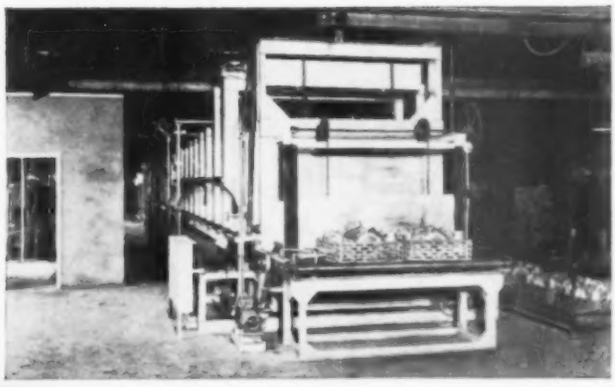


Fig. 3 (Left)—One of the Lane school team making a mold from a group of miscellaneous patterns. Fig. 4 (Right)—One of the Crane school team making a 3-part mold



Railroad Castings—Steel Castings of various shapes and sizes are uniformly annealed in the above single chamber car bottom type furnace.



Short Cycle Malleable—Short cycle malleable castings are scale-free annealed—continuously—in this special atmosphere furnace.

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Continuous and Batch Type
FURNACES
FOR
Annealing Castings
Designed and Built by
The Electric Furnace Co.
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Furnaces for Every Industrial Heating Process
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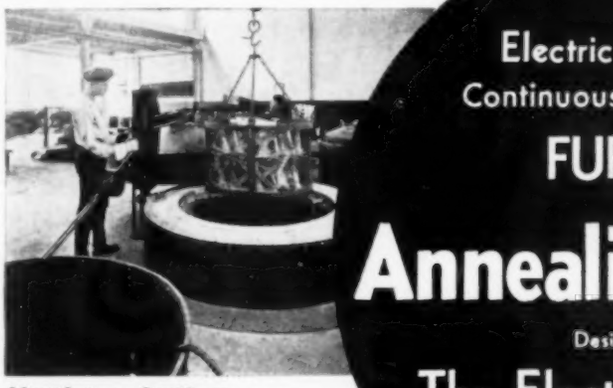
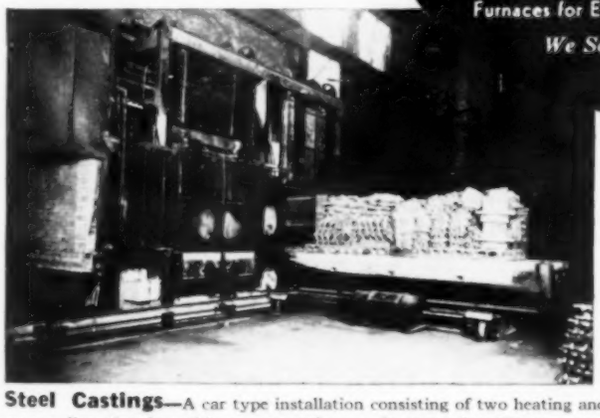


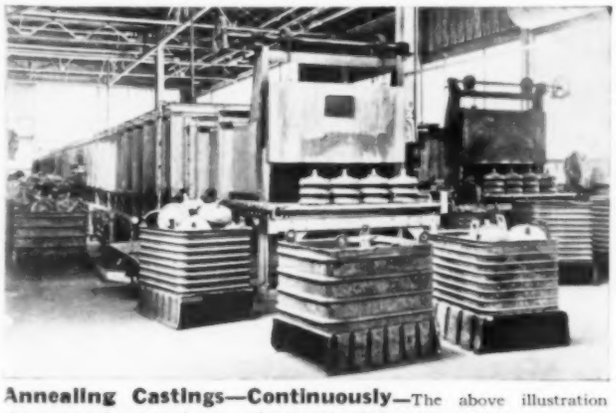
Aluminum Castings—The accurate temperature control and uniform heat distribution necessary for aluminum is provided by these circular pits.

Cast Brake Drums—Discharge end of a continuous oil fired roller hearth furnace annealing automobile brake drums.

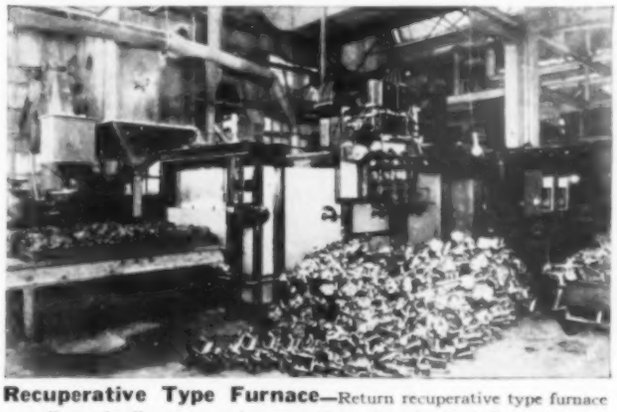


Steel Castings—A car type installation consisting of two heating and one cooling chamber with cross transfer car, for annealing 750 tons steel castings per month.

Annealing Valve Bodies—Large valve bodies, pipe fittings and miscellaneous other castings are uniformly annealed in these two fuel fired car type furnaces.



Annealing Castings—Continuously—The above illustration shows two of our continuous roller hearth, oil fired furnaces in a prominent plant for annealing castings—continuously.



Recuperative Type Furnace—Return recuperative type furnace annealing miscellaneous castings—continuously—the heat from the outgoing castings preheats the incoming material—saves fuel.

AJAX TOMBASIL INGOTS

(Tombac - Silicon)

A NEW ALLOY WITH UNIQUE PROPERTIES

A new Copper-Zinc-Silicon Alloy having unique properties—manufactured and distributed in ingot form under exclusive license agreement with the Anaconda-American Brass Company for the production of sand, chill and die castings not afterwards intended to be wrought.

• UNIQUE IN THE FOUNDRY

1—It is a high strength metal with less shrinkage than Manganese or Aluminum Bronze.

2—Forms little dross and, therefore, produces castings having a smooth skin of pleasing color.

3—So free flowing that castings of intricate ornamental design are true to pattern.

• UNIQUE FOR DIE AND CHILL CASTINGS

1—Can be cast at low temperature, thus insuring long die life.

2—Produces beautiful surface free of oxide.

3—High strength and hardness.

• UNIQUE IN SERVICE

1—Physical properties as determined under tension are between Gun Metal and Manganese and Aluminum Bronzes—hardness is greater.

2—Excels in corrosion resistance.

3—Wonderful wearing properties.

Attractively cheaper than 88 Copper 10 Tin 2 Zinc, 88 Copper 8 Tin 4 Zinc and Aluminum Bronze.

Ajax Standard Ingots

Ajax Plastic Bronze
Ajax Phosphor Bronze
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Ajax Hydraulic Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel Alloys
Ajax Aluminum Alloys
Ajax Manganese Copper
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Phosphor Tin
Ajax Nickel-Copper 50-50%

• PUBLICATION REFERENCES

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"A New Silicon-Zinc-Copper Alloy", THE METAL INDUSTRY (Great Britain) October 3 and 17, 1930 issues.

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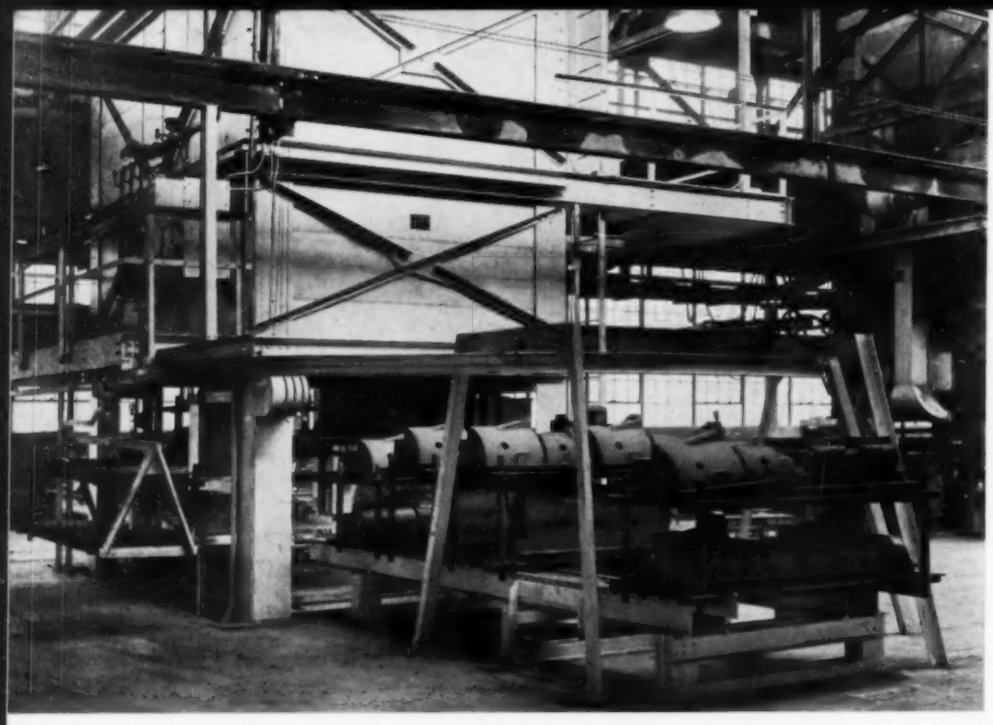

Fig. 1—Unloading side of new vertical oven, showing auxiliary handling equipment for cores up to 930 pounds

Tractor Cores Are Dried In Vertical Ovens

GRADUALLY increasing production in the foundry of the Caterpillar Tractor Co., Peoria, Ill., demanded more floor space. Space required for core racks and trucks had encroached on other departments. Rearrangement of some kind was imperative. Recently a vertical oven and auxiliary handling equipment for cores ranging in size from 162 to 930 pounds was installed. Design and installation of this equipment, also the original oven installation were by Detroit Sheet Metal Works, Detroit, under supervision of M. J. Gregory, foundry manager, Caterpillar Tractor Co.

Structural support of the new oven is made up of heavy members to cope with heavy loads. Conveyor members and drive shaft are of rugged design to take up the torsion and bending movements, particularly at periods when the ascending and descending sides of the conveyor are out of balance, for example when starting in the morning. The forged steel head shaft is 12½ inches in diameter. The head sprockets, 12 feet diameter, are steel plate disks with cast steel teeth segments bolted around the periphery.

The drive unit includes a 12-foot diameter gear on the head shaft, driven through a bronze worm unit, herringbone reducer and enclosed variable speed transmission from a 3-horsepower motor.

Core carriers are similar to those in the older ovens, grillage trays with studs at each corner. Pipe posts over these studs permit two trays to be racked, to form a double deck carrier. A roller conveyor extends from the coremaker's position into the loading station within the oven, and from the unloading station within the oven to a point outside where the individual dried cores are picked up by a crane.

After the first tray is loaded, the corner posts and upper tray are placed in position and loaded. The carrier then is rolled into the loading station of the oven where the oven conveyor picks it up and carries it through the evaporating, oxidizing, and cooling zones, finally laying it down on the rollers again. From here it is rolled out to a transfer point where the individual cores are rolled over, and then picked up by the overhead crane. Empty carriers are returned to the coremakers by a trolley fixture. One man does all the moving and transferring of cores and carriers.

Oven ventilation is based on a parallel and cross flow system. In the evaporating zone, care is exercised to keep the temperatures at a point that steam globules are not generated and retained within the body of sand after the surface is dried. In this zone, rapid circulation is provided at a soaking temperature, and directed so that the bases of the cores are dried at the same speed as the tops. Circulation is induced and controlled through fans and operating louvres.

After evaporation is completed the cores are subjected to a rapid heat, starting the oxidation of the oil binder. Oxidation is continued to the cooling zone. At this stage care is taken to avoid going beyond the point where the oils might carbonize. Through recirculation of heat, it is claimed the fuel cost of operating the oven is at a minimum.

Automatic temperature control is secured through devices supplied by the Leeds & Northrup Co., Philadelphia. The system embodies devices for safety factors, including safety pilots with magnetic cutoff valves, oven purging equipment, etc.

Where inadequate protective equipment is supplied, there is bound to result a false sense of security and the responsibility of the employer is increased.

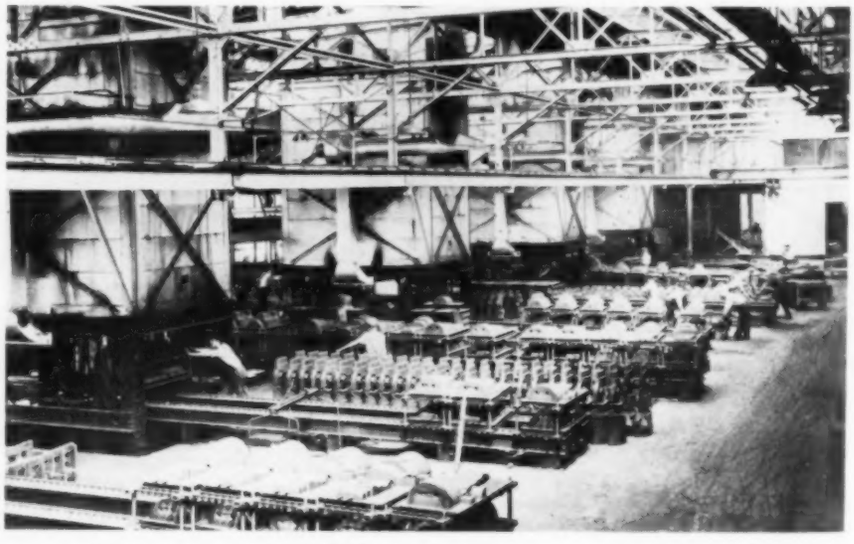

Fig. 2—General view of original battery of vertical core ovens for drying small and medium weight cores up to 250 pounds

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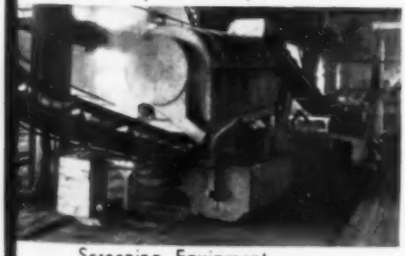
Portable "Sanditioner"

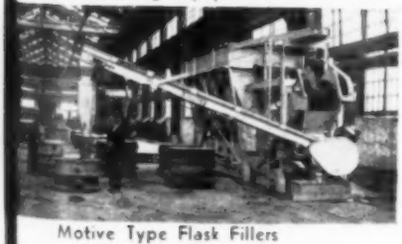
Belt Conveyors

Aerators

Steel Apron Conveyors

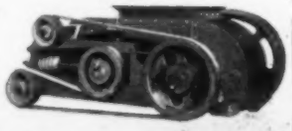


Screening Equipment



Motive Type Flask Fillers

Sand Mixers

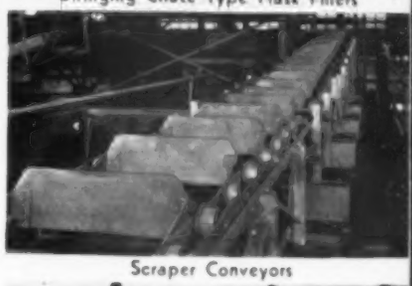


Disintegrators

Jeffrey Mold Conveyor installation in a high production Foundry

Pendant Type Mold Conveyors

Swinging Chute Type Flask Fillers



Scraper Conveyors

Charging Sand Mills by weight in a Jeffrey Sand Conditioning System

Revolving Boom Type Flask Filler

Automatic Batching of Sand Mills

Portable Wall-Type Flask Filler

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During the past few years real advances in the design and construction of this type of foundry equipment have been made. Jeffrey has been largely responsible for many of these cost-cutting innovations in design . . has been constantly giving attention to details of construction that make for lower maintenance costs.

Jeffrey can show you profitable results . . has the experience as evidenced by large number of recent installations. We pass this experience on to you. Whether for one unit or complete modernization . . call on Jeffrey.

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"LONG WEAR" BLAST CLEANING NOZZLES

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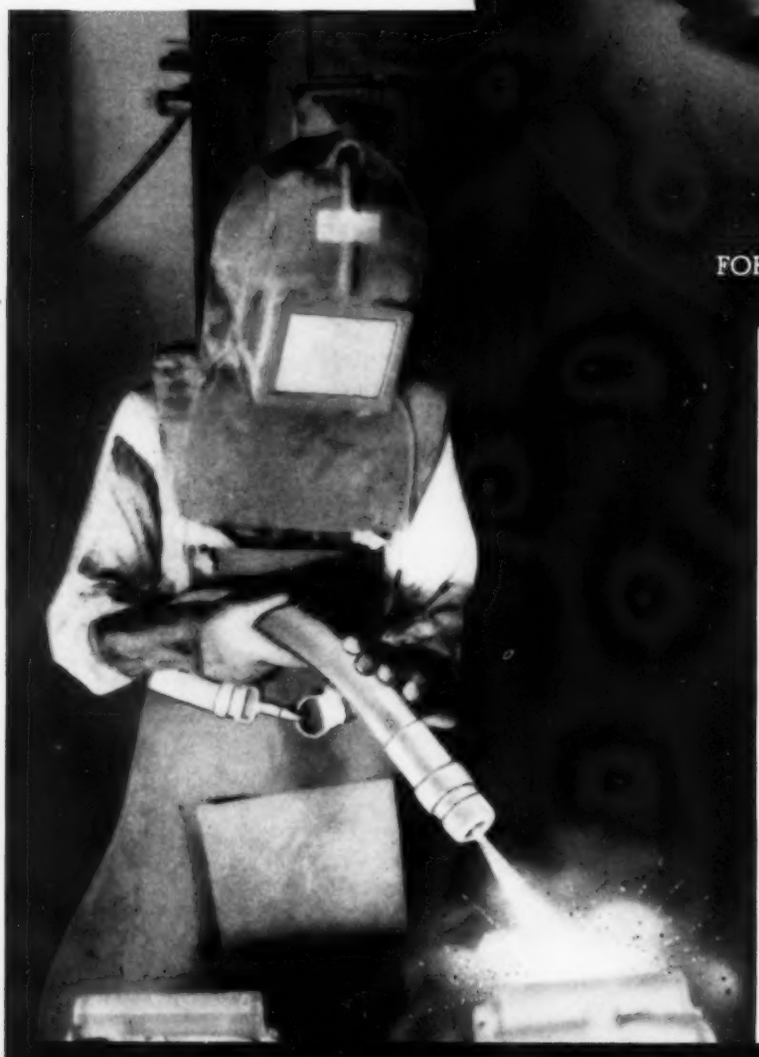
FOR EVERY REQUIREMENT



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Pangborn-Norbide* Nozzles have dollar value unequalled by any other on the market. Their **average** service is as much as 1000 times that of the common iron nozzle.

2. LESS AIR CONSUMPTION

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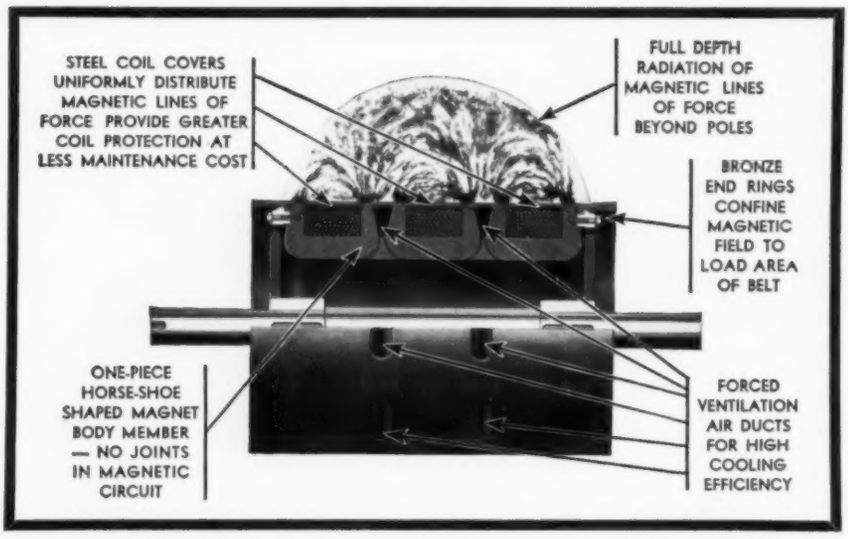
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Conditioning and tempering foundry sand sometimes presents difficulties because of the presence of unreclaimed iron in the form of fine shot, spillings, sprues, core wires and nails.

A positive and economical method of removing such iron is offered in the Stearns Magnetic Pulley installed at the end of a sand conditioning belt. It saves labor and reduces the time required to recondition sand and is automatic.

The Stearns Magnetic Pulley is available in complete, portable separator units, adaptable for use with a sand slinger.

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SECRETARY

April 15, 1937.

TO THE MEMBERS AND GUESTS
OF THE AMERICAN FOUNDRYMEN'S ASS'N.

Greetings!

Milwaukee is indeed pleased to be host to the American Foundrymen's Association on the occasion of their annual convention and Foundry Show to be held here May 3-7, 1937.

This is the fourth time we have been singled out for this honor since the Association was organized in 1896. We are proud of this distinction for two reasons: first, because Milwaukee is one of the important foundry centers of the country, and secondly, because our reputation for hospitality evidently is appreciated.

It is my hope that this year's convention will be more successful than any held previously and I feel safe in saying this because the Milwaukee Chapter of the A.F.A., under the Chairmanship of Wm. F. Bornfleth of Cutler-Hammer, Inc., is considered one of the most active chapters of the association.

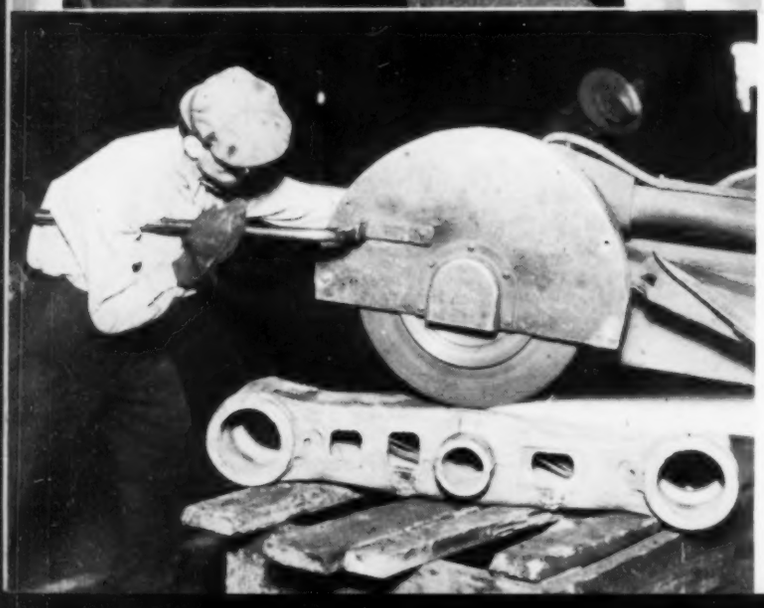
Moreover, Milwaukee has made great progress in industrial and civic development since your last convention here in 1924 and as a result your stay here should prove both interesting and profitable.

As Mayor of Milwaukee I extend a cordial invitation to all concerned to attend this year's convention and Foundry Show and I assure you of our fullest co-operation to insure their success.

Sincerely,

Daniel W. Hoan
Mayor

Mayor Welcomes Foundrymen



Milwaukee 1937

AN ANTICIPATED record breaking crowd of foundrymen streaming into Milwaukee by train, boat, airplane and automobile the week of May 3 to 7 will note many features of interest in this hustling, progressive city, one of the greatest industrial centers in the United States.

The first thing noted by denizens of smoke ridden cities is that the atmosphere is as clean and transparent, the sky is as blue as they are over any rural community where the fuel comes from an adjoining woodlot. Old timers will be reminded of the famous *Spotless Town* featuring a brand of soap that appeared in a series of magazines and billboard advertisements many years ago. Any person sufficiently interested will learn that Milwaukee has a smoke elimination ordinance on the books. Contrary to the practice in some other cities which also have smoke elimination ordinances on the books, authorities in Milwaukee see to it that the ordinance is observed.

Situated at Confluence of Rivers

The mayor and city council in Milwaukee are queer that way. They take things literally. When they pass a measure designed to promote the safety, comfort and convenience of the citizens, they put a few good size teeth into it and they see to it that the teeth are kept nice and sharp, well oiled and in good snapping condition.

Some dead and forgotten member of the Order of Platitude Makers is credited with the statement that every large city is fortunate in having a river in the vicinity. In this respect Milwaukee is triply blessed,

Convention City

By PAT DWYER

since not only one but three rivers, Milwaukee, Kinnickinnic and Menomonee, meander through the city. Singularly enough, these rivers were here before a white man ever set foot on the continent of North America. Advantages of the location apparently were realized by the Indians, the original native sons who maintained a more or less permanent camp long before Pere Marquette passed that way in 1673 after exploring the Mississippi in company with that other gallant adventurer Louis Joliet. Location of Milwaukee Bay is shown on a map prepared by Marquette and still preserved in the Jesuit college in Montreal, with other records and souvenirs of a man whose modest and weather stained black robe covered the heart of a hero.

Name Is Indian Adaptation

The Indian settlement at the confluence of the three rivers saw no further evidence of the white man for over 100 years after the passing of Marquette. Members of the various tribes Pottawattomies, Chippewas, Menomonees, Ottawas, branches of the great Algonquin tribe, Sacs, Foxes and Winnebagoes lived there and hunted in peace and comfort as their ancestors had lived and hunted for generations. Strangers may be interested to learn that the accent in Pottawattomies is on the *watt* and not as one naturally would suppose on the *tomm*. Also followers of the screen drama will be pleased to learn that the Sacs or Sauks have no connection with the terrible Si-oxes through whom that sterling actor W. S. Fields, armed only with a bowie knife in one hand cut his way through a solid wall of

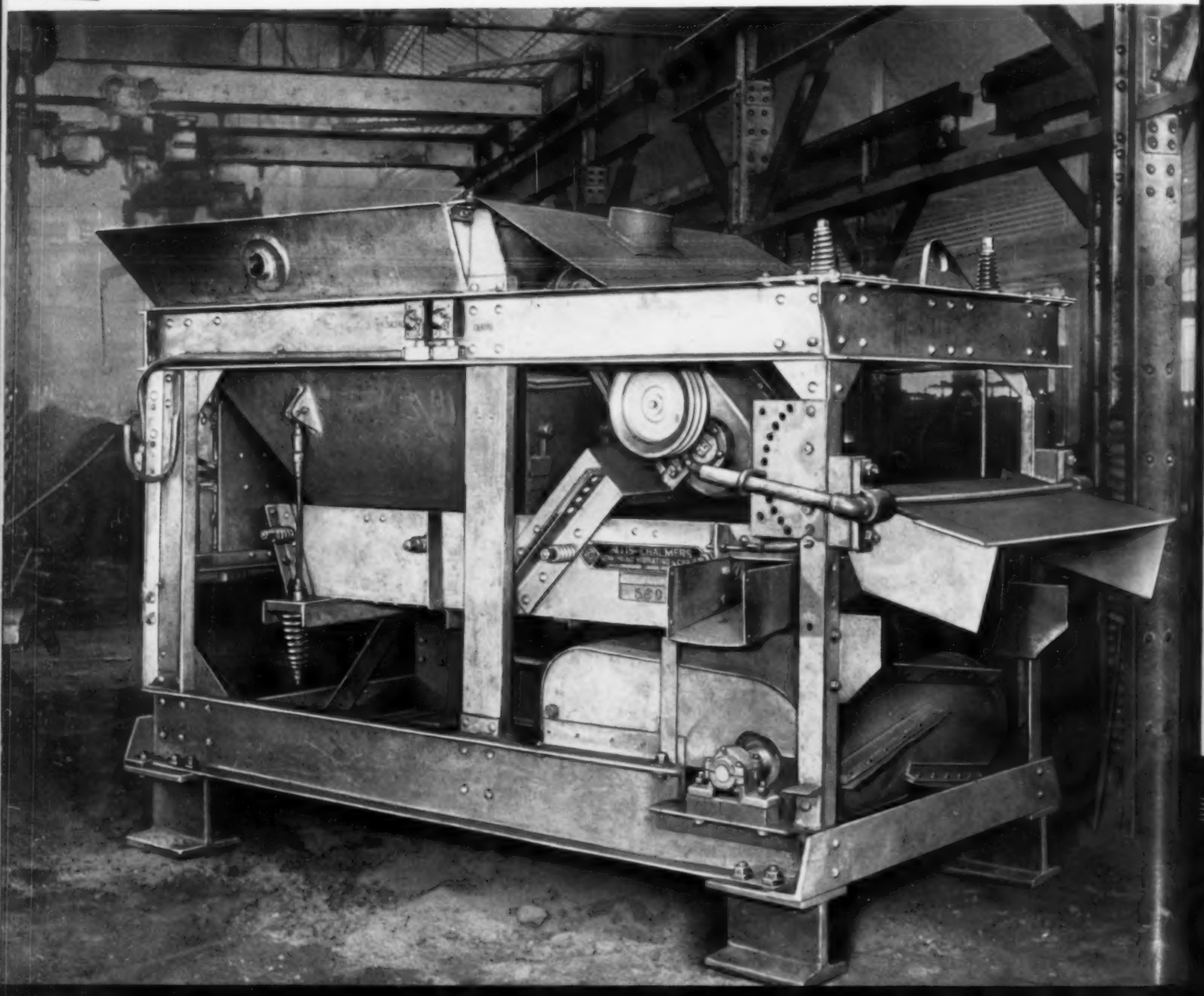
A New Method of Preparing Foundry Sand

ALLIS-CHALMERS has developed a new type of sand preparation unit which is low in both initial and operating costs, is portable, and will condition from 30 to 40 tons of sand per hour in one size and 50 to 60 tons in another. These units are recommended for use in preparing heap and facing sand and are especially suitable in jobbing foundries, and production foundries not served by fixed sand preparation equipment.

The units are simple in construction and easy to operate. Sand is loaded into a large capacity hopper by means of a small clam shell bucket. It is then fed onto an Allis-Chalmers Low-Head Vibrating Screen which operates in a horizontal plane. Refuse is discharged from each side of the screen. The sand passing through the screen falls on a pan, which is part of the screen body, and which conveys the reclaimed sand to the front of the unit where it is discharged onto the aerator. The aerator mixes, blends, fluffs and aerates the sand and piles it in a heap in front of the machine.

Allis-Chalmers has had many years of experience in building screening and classifying equipment and originally developed this unit to fill a need in its own foundries. A complete unit will be shown at the Foundry Convention in Milwaukee. It will pay you to look it over.

SAND PREPARING UNIT



CUPOLA BLOWERS — COMPRESSORS

Allis-Chalmers, builders of Blowers and Compressors for over half a century, has recently developed a line of turbo-blowers for supplying air to foundry cupolas. These blowers are sturdy in construction and very compact, the casing and baseplate are made of cast iron.

To insure accurate and automatic air control, the blower is furnished with a constant air weight control. With this means of control, the turbo-blower is capable of furnishing the proper amount of oxygen, regardless of the atmospheric conditions or the resistance in the cupola.

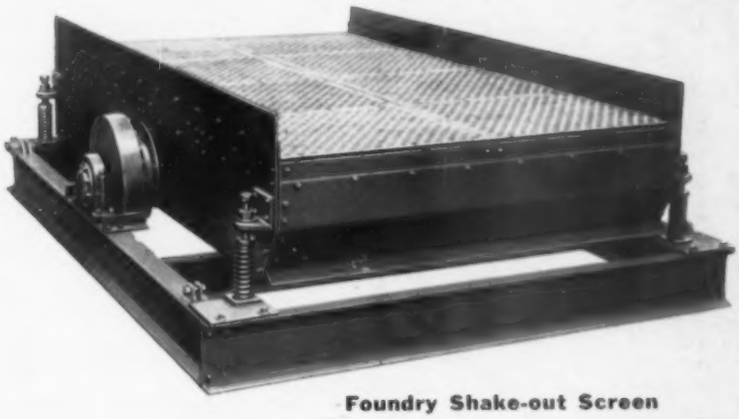
Rotary air compressors or vacuum pumps are built for pressures up to 100 lbs., vacuums to 29.75″ and capacities up to 2000 c.f.m.

Cupola Blower

Ro-Twin Compressor

FOUNDRY SHAKE-OUT SCREENS

The 7½′ x 12½′ Allis-Chalmers Flask Shakeout Screen as shown on the right is installed in a large steel mill. During a two year period of operation it has made great savings in time, labor and floor space. It has also greatly reduced the capital investment in flasks.

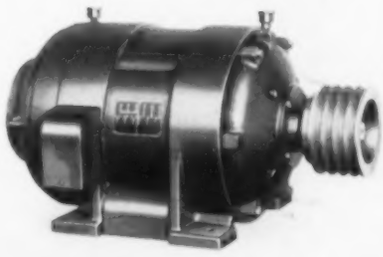


Foundry Shake-out Screen

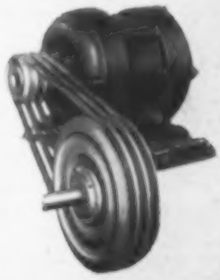
MOTORS — DRIVES

There is an Allis-Chalmers a-c or d-c Motor for every foundry job requiring over one horsepower. These are built in open and enclosed types to suit conditions of operation.

Texrope multiple V-Belt Drives are compact, positive, unaffected by dirt or moisture, economical, use no lubrication and little attention. Standard Texrope drives are built in ratings from ⅛ hp. up to several hundred hp.



Enclosed Fan-Cooled Motor

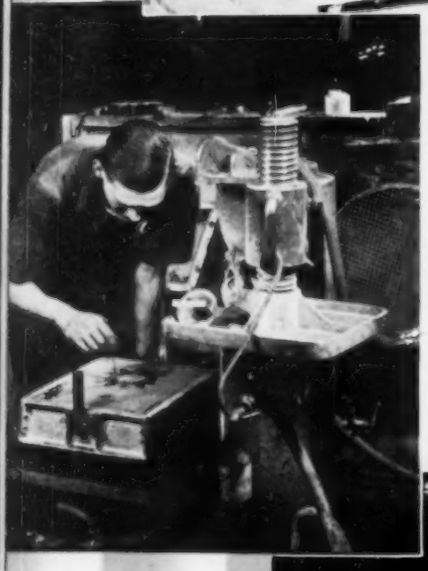


Texrope Drive

EQUIPMENT ENGINEERS TO INDUSTRY

ALLIS·CHALMERS

MILWAUKEE WISCONSIN



human flesh, while dragging his canoe behind him with the other hand! Yes, yes. Those were indeed stirring days.

Name of the present city is a compromise or adaptation of the Indian combination Man-ah-wauk-seps, meaning good lands. Since the Indians had no written language, the early white visitors pronounced the name to suit themselves with the result that many variations appear in early written records. For example in the *Jesuit Relations* the name is given as Milioke.

For many years after the place became a white man's settlement with the name pronounced Milwaukee, the population was split over the proper spelling. Two of the newspapers insisted the termination should be *kie*. One paper printed in English finally yielded to popular demand in 1844 and adopted the present spelling. A paper printed in the German language *Banner und Volksfreund* persisted in the *kie* ending until the last issue of that publication which appeared in 1880.

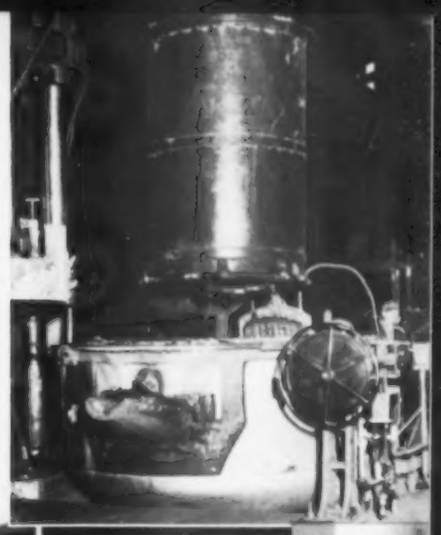
Following a policy of expansion, of pushing further and further into the wilderness, the American Fur Co., in 1790 sent Jacques Vieaw and Jean Baptiste Mirandeau from an established post in Green Bay to see about drumming up trade in the Indian settlement of Milwaukee. Jean, an adaptable fellow, married a Chippewa chief's daughter, name at present unknown, but apparently a very estimable lady. He opened a branch store, raised a family and for several years commuted between Green Bay and Milwaukee.

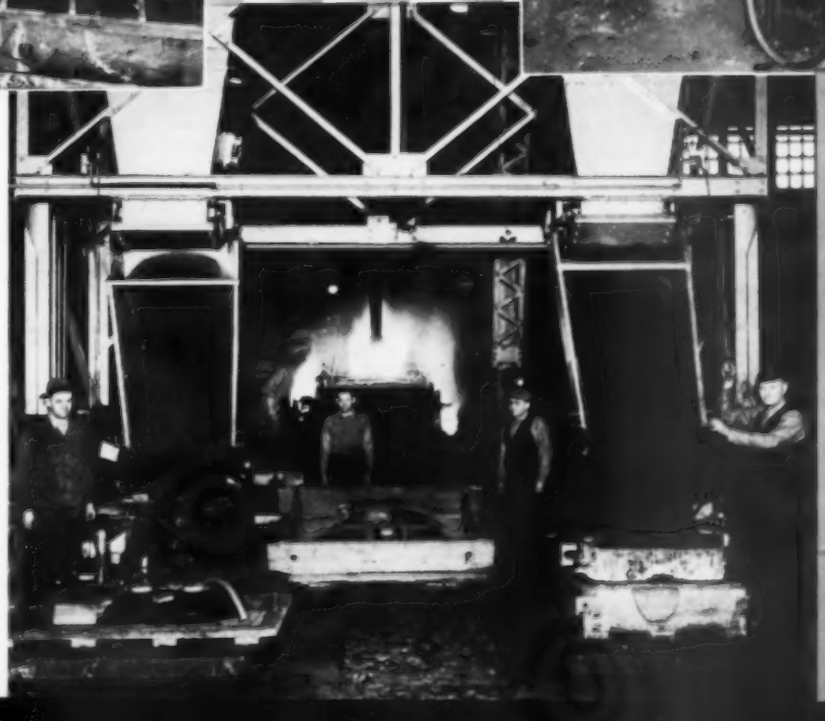
An assistant in Green Bay, one Laurent Solomon Juneau married Vieaw's daughter and since the status of a son-in-law is slightly higher in the social scale than that of a mere employe, Solomon was promoted to the position of manager of the branch in Milwaukee. From 1818 to 1833 he and his family were the only white

people in the settlement. Apparently Solomon had all the attributes of a great and a good man. He wielded tremendous influence among the Indians and later among the early white settlers. His memory is commemorated at several points in the city including Juneau Park and Juneau Hall in Milwaukee's magnificent public auditorium where the American Foundrymen's Association is staging the present convention and exhibition.

The settlement was on the direct line of travel between Fort Dearborn (Chicago) and Green Bay. As soon as the Indian titles were extinguished by the treaties of 1831 and 1833 with the Menomonees, colonists began coming to the neighborhood.

In 1833 Morgan L. Martin of Green Bay explored the harbor, made a map of the place and entered into an agreement with Juneau and Michael Dousman for its development. A sawmill was built in 1834. The East side was platted in the summer of 1835 and the west side a little later by Byron Kilbourn. The rival settlements, officially Milwaukee east side and Milwaukee west side, popularly were known as Juneautown and Kilbourntown. A third division known as Walker's Point was established on the south side by George H. Walker. For many years partisanship and sectional feeling ran high between inhabitants of the east and the west sides. The streets surveyed independently, did not match on opposite sides of the river and this led to a great deal of acrimonious bickering over the building of bridges.





The sections were incorporated separately as townships of Milwaukee county in 1837, but in 1839 united as wards of the same village, each one keeping financial and administrative autonomy of its own affairs. Walker's Point was annexed as a third ward in 1845 and in 1846 the three were incorporated as the city of Milwaukee of which Solomon Juneau was elected first mayor.

See Milwaukee Molders

DAVENPORT 34A JOLT ROLLOVER DRAW machine making truck rear axle drag molds. Note space conserved between machine and storage conveyor.

While attending the Milwaukee Foundrymen's Convention, be sure to visit our display (Booths 53, 55 and 180). You'll see Milwaukee Molders in action, and learn how to make good accurate molds on a fast production basis. Why not leave your molding problems with us at our booth? Then you can really enjoy Milwaukee's hospitality.

Milwaukee CORE GRINDER

Here is a grinder that's adaptable to a wide range of cores. Built with machine tool precision. Table mounted on large hardened ball bearings. Grinding wheel spindle and drive shaft mounted on dust proof precision bearings.

Milwaukee JOLT SQUEEZING STRIPPER

Free movement of car wheels lifted from track during jolting. Rugged construction eliminates whip. Patented feature prevents rebound on last jolt. Bearing pads kept clean automatically. Stripping frame, jolt table and cylinder virtually dowelled together by two large close-fitting hardened and ground guide pins. Equipped with special slow draw valve which cushions the pattern draw at time of dogging.

MILWAUKEE FOUNDRY

3238 W. Pierce St. Cable

In Action at the Show!

Davenport JOLT ROLLOVER DRAW

A universal machine that is completely air operated. Mold is jolted, bottom board clamped, mold rolled over, leveling device contacted and locked, bottom board unclamped, vibrated and drawn. All working parts completely enclosed in dustproof housings to insure long life.

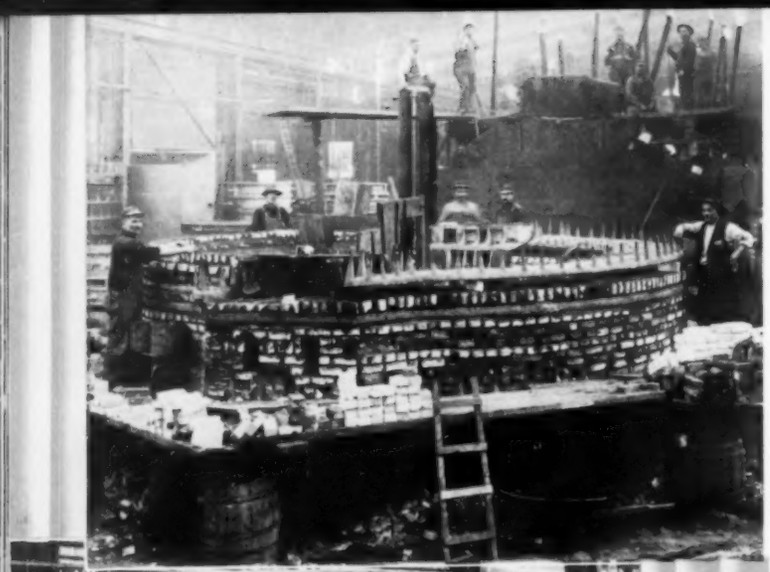
. . . and While in Milwaukee Visit the

First Commercial BRIQUETTING PLANT

For the benefit of Foundrymen attending the show, we have arranged for a practical demonstration at the Nu Scrap Briquetting Co. plant, 219 South 16th Street, Milwaukee. You will see a 350 ton Milwaukee Briquetting Press converting cast iron borings into 4″ briquets of sufficient density to permit handling to the cupola where they melt down in the same ratio as machinery scrap. Briquetting is the modern method of salvaging borings for remelting in the cupola, and the conversion cost is unusually low. Be sure to see this interesting demonstration.

EQUIPMENT COMPANY

Address: Milmoldco **Milwaukee, Wisconsin**



The first vessel anchored in Milwaukee Bay in 1779. A Chicago packet entered the river in 1823. The first newspaper, the *Milwaukee Advertiser,* began publication July 14, 1836 and a public school was opened in that year. In 1839 George Smith and Alexander Mitchell established the Fire and Marine Insurance bank which was one of the strongest banking houses west of the Alleghenies. Its notes passed at par through panics under which even government issues depreciated. The bank financed the Milwaukee and other western railroads. The first brewery, forerunner of a long line that made Milwaukee famous was built in 1840 by Owens and Pawlett. Connection with Chicago was established by telegraph in 1849 and by railroad in 1856. Fairly satisfactory for the time and place, but a far cry from the palatial Hiawatha and other modern whizzers that now roll off the 85 miles in 75 minutes.

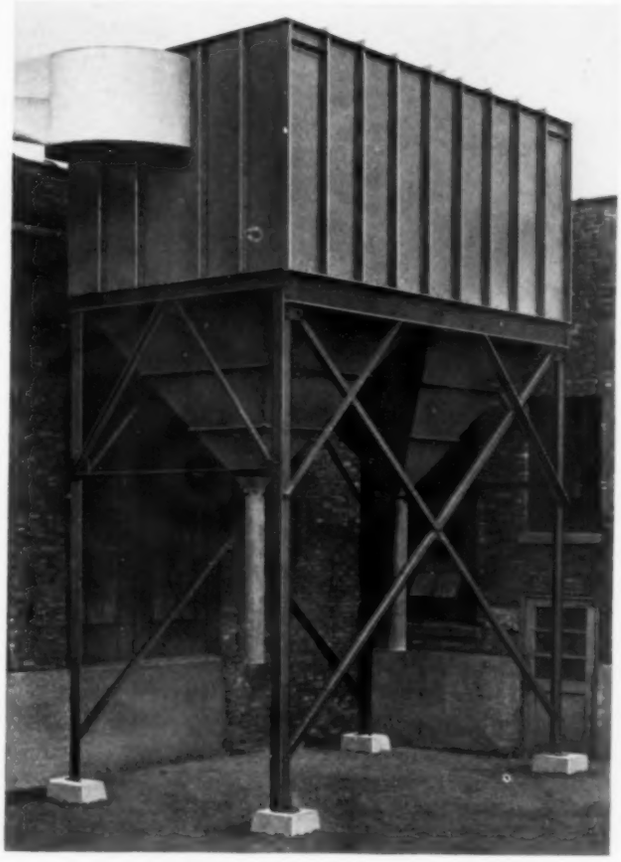
A stream of German immigration beginning in 1840, accelerated by the revolution of 1848 and continued for half a century exercised a strong influence on the commercial, social and cultural life of the city. In 1900, out of a total population of 285,315, the number of people of German birth was 53,854, and 151,045 in addition had one or both parents who hailed from Germany, a total of 72 per cent either of German birth or of the first generation. According to the 1934 estimate of the United States bureau of census the population of the city was 605,000, with the foreign born numbering 109,383. Predominating foreign groups include British, German, Polish, Austrian, Swiss, Italian and Hungarian, a truly cosmopolitan city.

THE photographs of Milwaukee foundry scenes are reproduced on these pages through the courtesy of the following companies: Allis-Chalmers Mfg. Co., Chain Belt Co., Falk Corp., Harnischfeger Corp., Nordberg Mfg. Co., Sivyer Steel Castings Co., and Spring City Foundry Co. THE FOUNDRY appreciates the kind co-operation of these firms and of the A.F.A. and the Milwaukee Association of Commerce in making possible this pictorial presentation as well as the one on pages 36 and 37.

Failure of the wheat crop in the Gennessee valley, N. Y., in 1840 turned the eyes and the imagination of certain long vision gentlemen to the west as a potential and coming wheat raising country. These men were not farmers or growers of wheat. They were engaged in the erection and equipment of mills for grinding the wheat into flour. About 1843 Capt. A. J. Langworthy and R. J. Benedict moved their plant from Rochester, N. Y., to Milwaukee to engage in the fabrication of anything that could be made from iron. With commendable patriotic and local pride the new plant was established under the name of the Wisconsin Iron Works.

One of the first jobs, and the first to be built in the state, was a large boiler for Philip Best's Lager Bier Brewery. Rolled plates for this boiler had to be brought from Buffalo. Three years after the plant was built it was damaged by fire to the extent of $80,000, of which only $5000 was covered by insurance. The plant was immediately rebuilt and

RUEMELIN DUST CONTROL EQUIPMENT



Ruemelin Filter handling 17,000 cu. ft. of dust laden air per minute

Years ago Ruemelin pioneered the "Tubular Bag Type" cloth dust filter for eliminating the objections of wear, inaccessibility and inefficiency of other types of dust filters. The Ruemelin patented filter construction has proven practical on many dust control installations. They incorporate features that assure—

SUSTAINED OPERATING EFFICIENCY, cloth bags effectively cleaned by motor driven shaker.
LOWEST MAINTENANCE COST. Cloth tubes and shaker has long life.
CONVENIENT ACCESSIBILITY for cloth inspection or quick replacement.
ALL WORKING PARTS on clean air side.

See our Exhibit Booths 146-148, American Foundrymen's Convention, Milwaukee, May 3-7. Carefully examine and investigate the Ruemelin Dust Filter and note the superior construction. The Ruemelin Dust Filter will prove to be the successful solution of your dust problem.

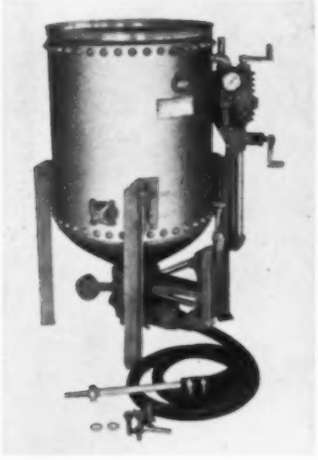
We engineer the complete installation and guarantee results.

Recent Installations of Ruemelin Dust Filters

Milfound Company	Waupun, Wis.
Universal Atlas Cement Co.	Leeds, Ala.
Iroquois Foundry	Racine, Wis.
Heil Company	Hillside, N. J.
Lockheed Aircraft Co.	Burbank, Cal.
Jungers Stove and Range Co.	Grafton, Wis.
Brillion Pulverizer Co.	Brillion, Wis.
Service Foundry Co.	Racine, Wis.
Loeffelholz Foundry	Milwaukee, Wis.
Motor Castings Co.	West Allis, Wis.
Milwaukee Chaplet & Mfg.	Milwaukee, Wis.

RUEMELIN BLAST CLEANING EQUIPMENT

Direct pressure blast room, furnished complete with mechanical abrasive handling and cleaning equipment.



Direct pressure generators. The modern blast cleaning machine. Equipped with rubber-seated air valves and abrasive valves for long wear.

Blast cabinet furnished with suction gun or direct pressure generator. Several sizes to select from.

RUEMELIN MFG. CO.

Engineers and Manufacturers

3850 N. PALMER ST., MILWAUKEE, WIS.

Evidence of OUR GROWTH.

1904

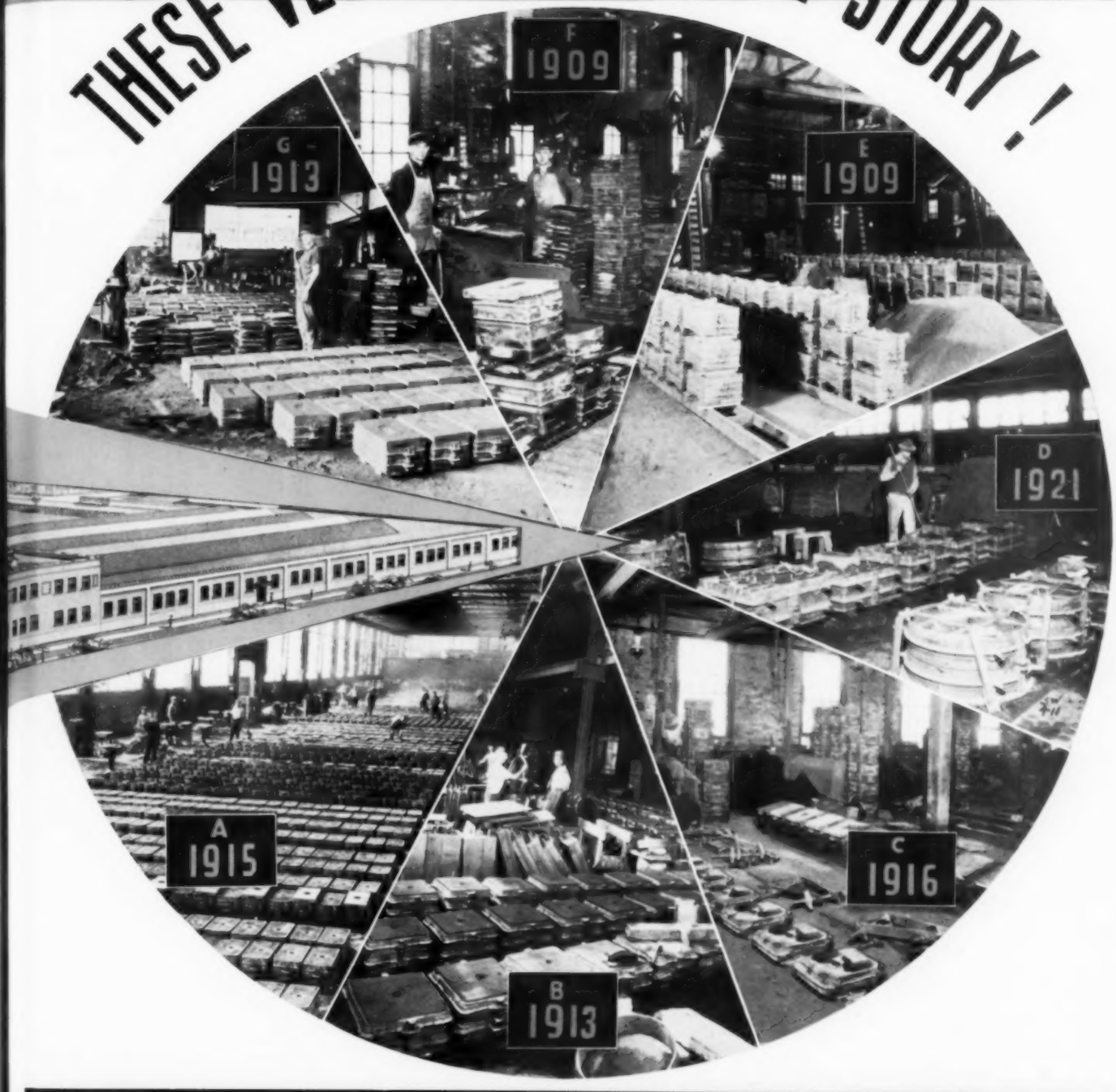
From a small factory of only 10,000 square feet of floor space in 1904 to a modern plant of 220,000 square feet of floor space in 1937 is an enviable record of growth . . a growth that reflects our steadily growing capacity to serve the foundries of America.

1937

Illustrated in the circle are just a few of the outstanding foundries with which we are justly proud to have dealt continuously since the dates shown on the photos.

A—Elmira Foundry Company
B—Chandler & Price Company
C—The Kitson Company . . . . . .
D—Olney Foundry . . . . . .
E—Magnus Company . . . . . .
F—Milwaukee Al. & Bronze Casting Co.
G—Spring City Foundry Co. . . . .

. . . THESE VETERANS TELL THE STORY!



STERLING *Wheelbarrow Company*
MILWAUKEE, WISCONSIN

We cordially invite you to visit our plant during the FOUNDRYMEN'S CONVENTION, May 3rd to May 7th

was operated profitably for many years, or up to the time when with many others it was almost wiped out of existence in the panic of 1857. Another period of prosperity followed and continued until 1869 when internal dissention brought about dissolution and absorption by the Filer & Stowell Co., and the Cream City Iron Works.

Roots of the present gigantic Allis-Chalmers Mfg. Co., also extend back to 1847 when two men, Decker and Sentle, hailing from the state of Ohio, set up a small shop known as the Reliance Works for the production of mill stones. This was the first attempt to produce these stone grinding disks at any point west of Cleveland, which long had a monopoly in this line.

The business soon expanded to include all the equipment required in the operation of a mill, including the water wheel, the almost universally employed prime mover. By 1852 the plant had been enlarged to include the production of stoves and was the largest individual manufacturing plant in the city. The company was severely affected by the depression of 1857 and therefore was in a receptive mood when overtures for the purchase of the plant and good will were made by Edward P. Allis, Charles D. Nash and John P. McGregor in 1860. These men then proceeded to organize a new company.

Under the new regime the business expanded rapidly by constantly entering new fields, a policy that has been continued up to the present in the immense plant built many years ago in West Allis, a suburb of Milwaukee. The present Allis-Chalmers Co., was formed in 1901 by consolidation of the original E. P. Allis & Co., Gates Iron Works, and Fraser & Chalmers, Chicago, and the Dickson Mfg. Co., Scranton, Pa. Several other manufacturing interests have been added to the consolidation since that time.

Milwaukee with 84 foundries engaged in the production of all kinds of castings, with the exception of the precious metals, presents a singularly appropriate setting for a convention and exhibition staged jointly by the American Foundrymen's association and the Foundry Equipment Manufacturer's association. Visiting foundrymen in addition to hearing discussion of foundry problems and seeing the best and latest examples of foundry equipment, may visit plants where modern practice is exemplified and where a considerable volume of machinery and equipment used in the

(*Concluded on page* 102)

Chorus To Sing at A.F.A. Annual Dinner

THE American Foundrymen's association has arranged an unusual event for its annual dinner to be held in Milwaukee, Thursday, May 6. The 1937 convention city possesses a musical organization known as the Lyric male chorus which has been recognized throughout this country and abroad as one of the leading organizations of America. The chorus has been in existence for a number of years. It has had several distinguished directors and has participated frequently in national conventions of the Federation of Musical groups.

The Lyric male chorus numbering about 90 men, has been engaged to give a short recital in connection with the annual dinner. That this opportunity is appreciated locally is evidenced by the fact that Milwaukee foundrymen have asked for advance reservations of 300 tickets for the banquet. They have requested that their reservations be alternated with visiting foundrymen so that all may have an equal opportunity in choice of seating.

Other features of the annual banquet will include presentation of gold medal awards for accomplishment in the advancement of foundry art and a brief address by a speaker of national prominence.

FALK STANDARDIZED PRODUCTS

IN FOUNDRIES

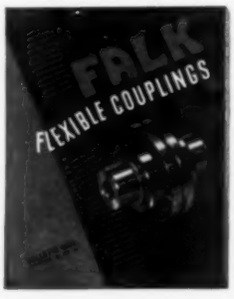
Worn bearings, contaminated lubricants, all-around trouble caused by grit and dirt in the air, may be eliminated by standardizing on Falk Reducers equipped with dust-proof oil retainers. Falk Reducers operate at 96 to 98½% efficiency at full load during the entire life of the unit and require nothing more than periodical inspection and change of oil.

Shock loads, as encountered on mixers or reciprocating conveyors, can be smothered by using Falk Flexible Couplings to protect the motors in the driven machines.

Eliminate shut-downs in your foundry by specifying Falk units to all manufacturers from whom you purchase equipment.

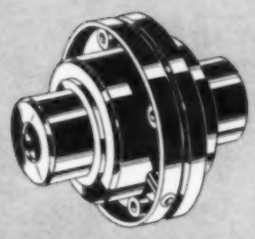
NEW FLEXIBLE COUPLING BULLETIN READY . . . . . .

Complete in every detail . . . specifications . . . ratings . . . dimensions . . . applications . . . a necessary tool in the hands of every engineer confronted with power transmission problems. Write for free copy.



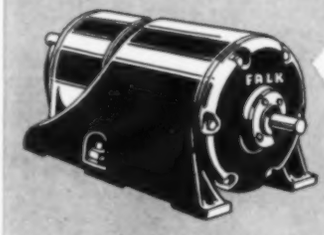
THE FALK CORPORATION
3050 West Canal Street
MILWAUKEE, WISCONSIN

Representatives in All Principal Cities



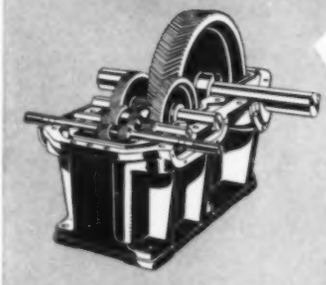
FLEXIBLE COUPLINGS

All-steel . . . shock absorbing . . . resilient . . . long-lived . . . designed to meet all practical requirements . . . available in any size from 2/5 H.P. to 18,000 H.P. at 100 R.P.M.



MOTOREDUCERS

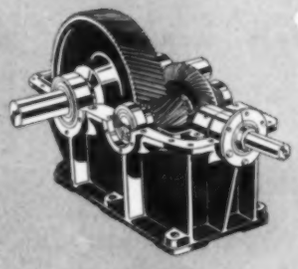
Falk Motoreducers are made in Integral and All-Motor types . . . horizontal and vertical . . . sizes ¾ to 75 H.P. . . . motor speeds 580 to 1750 R.P.M. . . . driven speeds 2 to 4000 R.P.M.



SPEED REDUCERS

Parallel Shaft

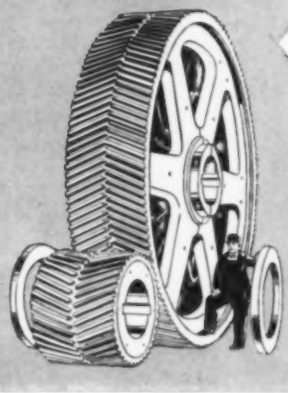
Falk Speed Reducers . . . parallel shaft with sleeve or roller bearings . . . single, double and triple reduction . . . from 1000 H.P. down to 0.5 H.P. at 100 R.P.M.



SPEED REDUCERS

Right Angle

Falk Right Angle Speed Reducers . . . horizontal or vertical...single, double and triple reduction . . . ratios from 1.5:1 to 515:1 . . . efficiencies at full load speed ranging from 96 to 98½%.



HERRINGBONE GEARS

Falk gears . . . herringbone, with staggered or continuous teeth . . . single helical . . . available for every requirement. Diameters from 1" to 16' . . . face widths from 1" to 6' . . . pitches from 25DP to ¾DP . . . efficiencies of 99% per train under full load

HEAVY DRIVES, MARINE DRIVES, OIL PRODUCTION UNITS, WELDING, CONTRACT MACHINING, STEEL CASTINGS.

Announcing

The first general exhibition
of the new
MODERN RICHARDSON CUPOLA CHARGER
at the
Milwaukee Convention
on the
STAGE of
MAIN AUDITORIUM

Patent Applied For

Front View

MODERN

Covered and Insulated Ladles
Lifetime Geared Ladles
Improved Bottom-Pour Ladles
Metal Pouring Systems
Crane and Monorail Systems for Metal and Mold Handling
Furnace Charging Cranes
Sand Conditioning Systems

Consider the following advantages of this new charger, operated directly from the yard level.

1. Low first cost makes possible the use of this charger on small and large cupolas.
2. Greatly reduces melting cost.
3. Deposits charge in cupola uniformly.
4. Can be installed without major building changes or a large amount of yard equipment.

Investigate the details at the CONVENTION

MODERN EQUIPMENT COMPANY

PORT WASHINGTON, WIS.

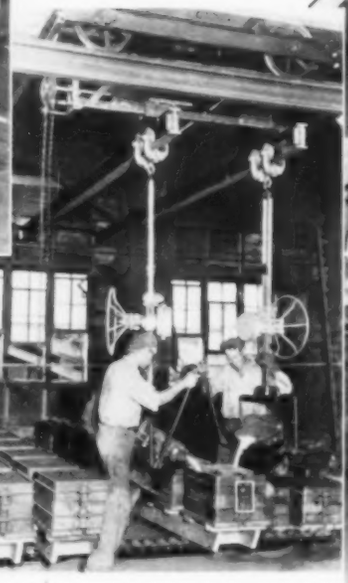
MODERN EQUIPMENT CO.

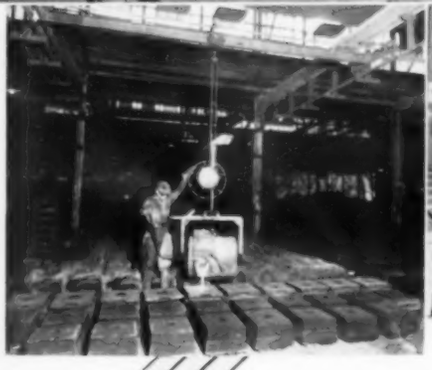
THE STORY OF *Modern* SEALED HEAT

Will be exhibited at the **MODERN BOOTH** on the **STAGE** of **MAIN AUDITORIUM**

In its latest developments

Patents Applied For





Come in and see the actual equipment including complete metal handling facilities; ladles lined and ready for pouring. Discuss with MODERN ENGINEERS installations like those shown above; for instance:-

Tons of metal held in storage regularly for 30 to 45 minutes.
One man pouring several tons of metal with ease with 600 pound cylindrical ladle pouring unit.

MODERN EQUIPMENT COMPANY

PORT WASHINGTON, WIS.

MODERN EQUIPMENT CO.

operation of the plants is designed and manufactured.

Training of apprentices, good housekeeping programs and other modern phases of foundry practice for many years have engaged the attention of Milwaukee foundrymen. Many of the forward movements inaugurated in this city served as models for similar programs adopted by foundrymen elsewhere.

The city has a $5,000,000 vocational school, claimed to be the first and foremost of the type in the United States. The building occupies an entire city block, contains several hundred classrooms, two auditoriums, one seating 2000 people, 202 faculty members, approximately 30,000 students. Among the 203 courses offered, classes in industrial rehabilitation work are conducted for crippled students and those who sustained injury in industry.

Educational system of Milwaukee includes 85 elementary schools, five junior high and six senior high schools, four combination senior and junior and senior high schools, four junior technical high schools, two technical high schools with a total registration in all schools of 90,455. In addition to various conservatories, institutions and schools of music, business and art, the city houses the following institutions of higher learning: Marquette University, Milwaukee Downer College for Women, Wisconsin State Teachers college, Concordia college, University of Wisconsin extension division.

First In Traffic Safety

Other public buildings and points of interest in the city include the auditorium, scene of the present convention and exhibition staged under the auspices of the American Foundrymen's association. This building has seven halls under one roof, total seating capacity approximately 15,000; space available for exhibition purpose, 104,950 square feet.

A civic center completed in 1931 at an approximate cost of $10,000,000 covers a scientifically designed court house and public safety building for city and county government agencies. The Federal building and post office including an annex completed in 1932 occupies a full square block. Exhibits of valuable paintings, sculpture and other objects of art are on display at the Layton art gallery and school.

The public library with 950,000 volumes also houses a public museum containing a collection of historical relics and scientific curios with early American characterization. Washington Park Zoo, occupying 45 acres and presenting a great number of interesting birds, animals and reptiles, has the rather rare distinction of being the only place of its kind where polar bear cubs have been raised to maturity.

In the field of public health and safety, Milwaukee won first place for the fourth consecutive year in a traffic safety contest sponsored by the National Safety council in cities with a population over 500,000. The city won national honors for the 12th consecutive year in a national fire waste contest, also for the 5th consecutive year was a winner in the national health contest sponsored by the chamber of commerce of the United States. Death rate from automobile accidents in 1934 was 10.8 (*Please turn to page* 112)

SAND HANDLING

HOW TO HANDLE IT IF IT IS IN THE FOUNDRY

CASTING HANDLING

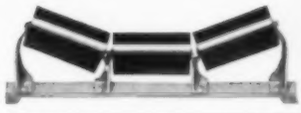
MOLD HANDLING

Get the Most From Your Plant—Modernize With Rex Foundry Equipment

● You increase the efficiency of every man in your foundry—eliminate the wasted minutes that result from using old handling methods—when you bring your production line up to date with Rex Foundry Equipment. It is your assurance that your plant is producing its greatest possible volume.

Combining the benefits of over thirty years of experience in foundry operation and design with the skill and ability to correctly understand and provide for your specific needs, Rex offers modern and effective equipment for handling molds, castings and sand—that will get you the *most* from your plant.

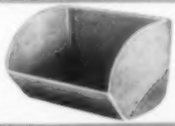
While in Milwaukee for the convention, call at Booth Nos. 268 & 270 and ask our representatives for more information.



Rex-Stearns Timken Idler

Rex Mold Car

Rex Apron Conveyor



Rex Foundry Type Self-Cleaning Bucket

CHAIN BELT COMPANY, 1671 West Bruce Street • Milwaukee, Wisconsin

REX

CHAIN BELT COMPANY of MILWAUKEE

Chain and Belt Conveying

A Cordial

SINCE 1892

With the publication of its September, 1937 issue, THE FOUNDRY will have completed forty-five years of uninterrupted service to the foundry industry.

We reflect with satisfaction on the part it has been the privilege of THE FOUNDRY to play in the growth and development of the foundry industry during this eventful half-century.

To the thousands of foundrymen who are the foundry industry, we express our appreciation for their many years of readership and for their assistance in making THE FOUNDRY more than a mere paper and ink interpretation of foundry news and practical information pertaining to casting practice.

Now and in the years to come, THE FOUNDRY aims to serve its industry by serving each individual foundryman in as personal and helpful a way as possible.

THE FOUNDRY *exhibit will occupy Booths 278 and 280—immediately to the right of the main entrance to Milwaukee Auditorium.*

J. M. LATHROP
Advertising Manager

F. G. STEINEBACH
Editor

PAT DWYER
Engineering Editor

EDWIN BREMER
Metallurgical Editor

L. C. PELOTT
Chicago

Welcome!

We extend a most cordial welcome to all of you—visiting foundrymen, exhibitors and representatives—to make THE FOUNDRY exhibit space your "general headquarters" while at the convention.

You are invited to drop in on us frequently when in Milwaukee, and take advantage of a spot prepared for you as a place to rest, to meet friends, to renew old acquaintances, and to talk things over.

The entire staff of THE FOUNDRY will be in attendance, ready to serve you, to make your stay in Milwaukee as pleasant and profitable as possible.

THE FOUNDRY

A PENTON PUBLICATION

J. F. AHRENS
New York

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Pittsburgh

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Cleveland

R. C. WELLMAN
Editorial Representative

G. A. POPE
Asst. Adv. Mgr

Milwaukee Foundries Produce Diversified Castings

MILWAUKEE is one of the leading industrial centers of the country with a diversity of products that make it a unique manufacturing center. In value of manufactured goods, the metal industry ranks first and its foundries are pre-eminent and varied. The Milwaukee district is one of the six largest manufacturers of castings in the United States, employing thousands of men and the total of foundry products in the area provide payrolls running into the millions.

The market served is not only country wide, but also many of the products in which castings play an important part are shipped to Europe, Asia, Africa, and South America. Some of the largest castings produced in recent years, have been manufactured in Milwaukee for hydroelectric service. Numerous plants in the district will be open for visitation during the week according to the Plant Visitation committee and the schedule is indicated on page 108. Information on typical Milwaukee foundries presented through the courtesy of the Milwaukee Association of Commerce follows:

ALLIS-CHALMERS MFG. CO. WEST ALLIS WORKS—Products cover power, electrical industrial and agricultural machinery, a more diversified line of products than any other organization in the United States ranging from heaters and air conditioners for small homes to 115,000 horsepower hydraulic turbines and 125,000 kilowatt steam turbine generator units for supplying power and light. The larger of the two gray iron foundries is housed in a building 996 feet long and 221 feet wide. Castings of any size, 120 tons and over produced here. Soft iron or high quality iron-alloy castings of great strength. Melting equipment consists of cupolas for cast iron and crucibles for brass and aluminum. Heating or annealing furnaces of both gas and oil types. Other equipment includes huge traveling cranes, rotary molding machines, locomotive type sand slingers, and high pressure hydraulic casting cleaner which reduces the cleaning of difficult large castings to minutes instead of the hours or even weeks formerly required. Offers a four year foundry apprentice course under supervision of the Wisconsin Industrial commission.

BADGER MALLEABLE & MFG. CO.—Producing malleable iron castings for practically all jobbing work. Air furnaces. Pulverized coal annealing ovens. One molder gives his entire attention to the training of molder apprentices.

BELLE CITY MALLEABLE IRON CO. Racine, Wis.—Castings for automobiles, railroads, and tractors, implements. Well equipped for producing malleables of heavier type. Use air furnaces and electric furnaces, dressler tunnel kiln for malleable, oil fired ovens for steel. Makes patented water cooled skimmer for skimming slag from melting furnace. Employ two indenture apprentices and 60 apprentice squeezer molders under instruction.

BUCYRUS-ERIE CO., South Milwaukee—Castings produced exclusively for own excavating machinery. Equipment includes 2 basic open hearth furnaces and 1 basic electric furnace, oil and electric car-type annealing furnaces, casting washer 25 feet x 25 feet x 16 feet 9 inches supplied with water at pressure of 300 pounds per square inch. Largest finished product 30 cubic yard stripping shovel. Largest casting a one piece cast dipper, 18 cubic yards capacity, weight 40,000 pounds. Training in all trades under contract and under the joint supervision of apprentice supervisor and state industrial commission.

CRUCIBLE STEEL CASTING CO.—Castings for road machinery, cranes and tractors. Electric melting and heat treating furnaces. Unusual casting—hammer sides, others from 1 pound to 10 tons.

CUTLER-HAMMER INC., FOUNDRY DIVISION—Gray iron, semisteel and nonferrous castings. Two cupolas for iron and five Fischer furnaces for nonferrous metals, wheelabrator for cleaning castings. Apprentices attend vocational school one day a week, four days of practical experience.

THE FALK CORP.—Founded 1894. Jobbing work of all kinds for railroads and cars, builders, machinery builders, marine work, power plants, specialists in gears. Three 25-ton acid open hearth furnaces fired with oil. Seven car type oil fired furnaces of various sizes. Hydroblast cleaning room using combined sand and water. Not over 20 per cent of output produced for own use. Outside of castings, manufacture herringbone gears, speed reducers, motor reducers, flexible couplings. Outstanding castings from 1 pound to 160,000 pounds, hydro-electric power plant castings, steam hammers, large turbines, large gears. Leader in apprentice training. Originator of the Milwaukee Plan carried out successfully in foundry.

FEDERAL MALLEABLE CO.—Finished products: Automotive, agricultural implements, and miscellaneous machinery castings. Malleable iron castings from 0.03 pounds to 400 pounds. Use air furnaces, powdered coal and hand fired periodic furnaces, sand conditioning and handling machinery.

GENERAL MALLEABLE CORP., Waukesha, Wis.—Produce malleable, gray iron and aluminum castings. Equipment includes reverberatory furnace for malleable, cupola for gray iron, pot and rotary type for aluminum; box type annealing ovens for malleable.

McLAIN GRADUATES
Known Throughout the World!

Foundrymen who combine scientific knowledge with practical application are becoming leaders in iron and steel foundries throughout the industry. McLain graduates are both practical and technical.

AMONG THE LONG LIST OF McLAIN CLIENTS ARE:

FIVE PAST PRESIDENTS OF
THE AMERICAN FOUNDRYMENS ASSOCIATION!

FIVE PAST PRESIDENTS OF
THE BRITISH FOUNDRYMENS ASSOCIATION!

THE OLDEST MEMBER OF THIS GROUP
WAS 66 WHEN HE GRADUATED

McLain's System not only teaches theory but also gives practical instruction and formulas to produce superior metal for castings. Beginning with Cupola Practice, every cupola, fan, blower and component part is considered as a separate study and we have proven that cupola practice is a science.

FOR INSTANCE: Millions of the semi-steel shells produced during the World War were made by American foundrymen who were graduates of McLain's System and showed a tensile strength of 40,000 pounds per square inch and resistance to hydraulic pressure of 4000 pounds per square inch. This metal was melted in the cupola!

DAVID McLAIN

Awarded The J. H. Whiting Gold Medal at the Detroit convention 1936. In recognition of his contributions to the Foundry Industry of America in stimulating better melting practices.

Mr. McLain is a member of the following societies:

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS
AMERICAN FOUNDRYMEN'S ASSOCIATION
AMERICAN SOCIETY FOR METALS
ENGINEERS' SOCIETY OF MILWAUKEE
HONORARY MEMBER — INSTITUTE OF BRITISH FOUNDRYMEN

Young Foundrymen—Attention!

Ninety per cent of the requests received by us today are for foundrymen with knowledge of semi-steel castings. McLain's System covers the subject of semi-steel exhaustively.

Write for Free Information

McLAIN'S SYSTEM, INC.

803 Goldsmith Building **Milwaukee, Wisconsin**

Time Table for Plant Visitation

NAME OF PLANT	TIME OF VISITATIONS
Badger Mall. & Mfg. Co. South Milwaukee	May 4-5-6, 9 a.m. to 4 p.m.
Belle City Malleable Iron Co. Racine	Any time
Bucyrus-Erie Co. South Milwaukee	May 5-6, morning
Federal Malleable Co. West Allis	May 4-5-6, 9 a.m. to 12 noon-2 to 5 p.m.
Koehring Co. Milwaukee	May 4-5-6, 9 a.m. to 12 noon
Kearney Trecker Co. West Allis	May 4-5-6, 9 a.m. to 4 p.m.
Liberty Foundry Co. Wauwatosa	May 4-5-6, 9 a.m. to 12 noon
Loeffelholz Milwaukee	May 4-5-6, 9 a.m. to 3 p.m.
Maynard Steel Casting Co. Milwaukee	May 4-5-6, 9 a.m. to 12 noon
Milwaukee Mall. & Gray Iron Co. Milwaukee	May 4-5-6, 9 a.m. to 12 noon
Nordberg Mfg. Co. Milwaukee	May 4-5-6, Any time
Rundle Mfg. Co. Milwaukee	May 4-5-6, 9 a.m. to 12 noon
Sivyer Steel Casting Co. Milwaukee	May 4-5-6, 9 a.m. to 12 noon
Smith Steel Casting Co. Milwaukee	May 4-5-6, All day
Universal Foundry Co. Oshkosh	May 4-5-6, 10 a.m. to 12 noon
Vilter Mfg. Co. Milwaukee	May 4-5-6, 9 a.m. to 12 noon
Wisconsin Appleton Co. South Milwaukee	May 4-5-6, 10 a.m. to 5 p.m.
Zenith Foundry Co. West Allis	May 4-5-6, Any time

KOEHRING CO.—Manufacturing pavers, gasoline shovels and mixers; gray iron and meehanite castings. Cupola melting equipment. Largest castings 5 tons; smallest, 1 pound. Many made for special applications. Have contract with industrial commission for apprentice training.

LIBERTY FOUNDRY INC.—Produce light gray iron, hardware, light automotive and other castings where fine finish is desired. Use two cupolas, small oil fired annealing furnace, wheelabrator, core blowing machine. Smallest casting made, 1 ounce,—largest, 40 pounds. State indenture apprentices, two co-operative students, Marquette university.

MAYNARD ELECTRIC STEEL CASTING CO.—Carbon and alloy steel castings. Equipment includes: two 4-ton and one 1-ton electric furnaces for melting, three 30 to 40 ton oil fired and two 5-ton oil fired furnaces. Castings vary from several ounces to 13 tons. Employ seven apprentices under contract.

MILWAUKEE MALLEABLE & GRAY IRON WORKS.—Malleable, gray iron and semisteel, alloy irons. Melting equipment, air furnaces for malleable, cupola for gray iron and semisteel. Periodical annealing ovens. No regular apprentice system but continually train employes for molding, coremaking and other advanced positions.

MILWAUKEE STEEL FOUNDRY CO.—Alloy steel castings resistant to corrosion, high temperatures, shock and abrasion.. Also, carbon steel castings. Use electric furnaces for melting, electric and oil-fired furnaces for cleaning. Completely equipped chemical and physical laboratory. Make unusual castings of high magnetic permeability, largest 6000 pounds, smallest, ¼-pound.

MOTOR CASTINGS CO.—Over 550,000 air cooled cylinders produced up to April 1. Other castings, cylinder heads, manifolds, crankcases, refrigerator cylinders, hydraulic valves. Melting equipment, three cupolas, 44, 48 and 20 inches. Largest casting 1870 pound crankcase for oil field diesel; smallest, 1.0 pound cam gear for air cooled engine. For outstanding uses castings of Ni-resist iron, non-magnetic corrosion and heat resistant alloyed cast iron.

PELTON STEEL CASTING CO.—Miscellaneous castings for the jobbing trade ranging from 2000 pounds to 1 ounce. Use 1 Pittsburgh Electromelt furnace, 1½ ton capacity, car type oil-fired annealing furnace, 10 tons capacity.

RUNDLE MFG. CO.—Gray iron castings for sanitary ware and warm air furnaces. Only for own use. Two cupolas and continuous molding sandslingers. Finished products include enameled plumbing fixtures, large apron bath tubs, and miscellaneous furnace parts for warm air furnaces.

SIVYER STEEL CASTING CO.—Carbon and alloy steel castings, heat and corrosion resistant castings, differentially hardened castings. Moore electric furnaces for melting and 1 electric, four oil and three gas furnaces for heat treating. Sand and mold handling equipment. Finished products include refinery fittings and specially heat treated steel castings. Castings from ¼-pound to 4000 pounds. Indentured apprentice under Wisconsin Industrial commission.

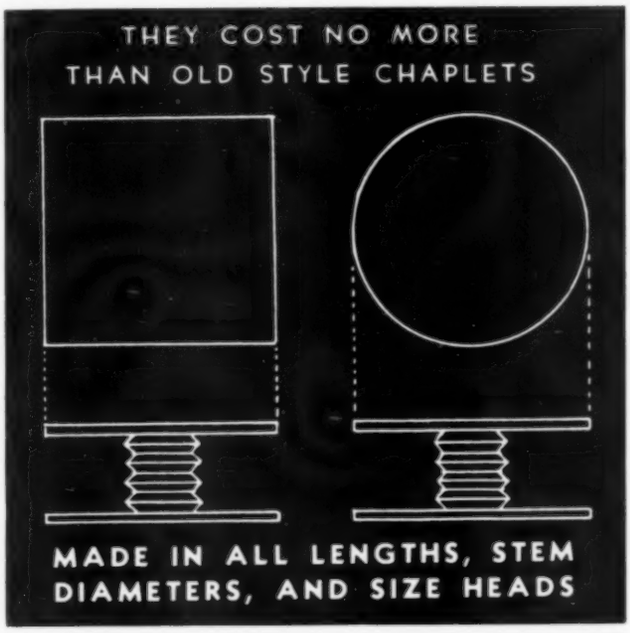
SMITH STEEL FOUNDRY CO.—Successors to George H. Smith Steel Casting Co. Transfer made March 1, 1937. New president, Edward A. Bacon, purchaser. The oldest existing steel foundry in the state. Founded 1896 by John M. Stowell. Taken over 2 years later by George H. Smith, a brother of A. O. Smith and C. S. Smith. Produce steel castings, carbon and alloy, in weights from ¼ to 10,000 pounds. Equipment includes Pittsburgh acid electric melting furnace, electric heat treating furnace fully controlled with thermostats, sand control. Finished products low carbon for electrical purposes, castings for tractors, road machinery, shovels, drag lines.

SPRING CITY FOUNDRY CO., Waukesha, Wis., Automotive castings, diesel cylinder heads. Use two cupolas for melting. Other equipment, conveyor type core baking oven, sand slinger installation, mechanical charging on cupolas. Castings from 1 pound to 1500 pounds.

VILTER MFG. CO.—Gray iron and semisteel castings, cupola melting equipment. Heat treating done by other firms. Castings for own refrigerating and air conditioning equipment, special castings and high test iron

Welcome to Milwaukee!

HOME OF MILWAUKEE THREAD STEM DOUBLE HEAD AND FORGED SINGLE HEAD CHAPLETS



THREAD Stems fuse in.
Not *one* but a dozen separate circular rings which have a larger diameter than the size of the stem.

The welded heads are made of one piece metal, impossible to separate head from stem.

Wafer thin heads. Surface casting marks are reduced. Machine cost lowered.

Pure tin coating. To promote perfect fusing.

Made of special low Carbon quick fusible metal.

Milwaukee Chaplet & Mfg. Co.
1023 South 40th Street,
MILWAUKEE, WIS.

GATES AND RISERS FOR CASTINGS

By Pat Dwyer

A COMPLETE encyclopedia, a ready reference and a practical guide to sound foundry practice. In addition to a description of every conceivable type of gate and riser, the text covers the application and function of gates and risers to all sizes and types of castings. Illustrations on almost every page enable the reader to grasp the salient points with a minimum of study.

363 pages
244 illustrations

Indexed for ready reference

Price, $3.15 Postpaid

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1213 W. 3rd St. Cleveland, Ohio

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WALTER GERLINGER, Inc.

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MArquette 0673

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Bentonite	Limestone
Cereal Binder	Molding Sand
Core Sand	Revivo Bond
Fire Brick	Sandblast Sand
Fire Clay	Silica Flour
Fuel Oil	Silica Sand
Lake Sand	Steel Abrasive

Foundry Equipment

•

for machine tool manufacture. Castings vary from 4 ounces to 30 tons. Indenture foundry apprentices under the Wisconsin Industrial commission.

WALKER MFG. CO., Racine Wis.—Light, medium and heavy type malleable iron castings. Use air furnace, powdered coal fired for melting; periodical ovens, powdered coal fired for heat treating. Automatic coal delivery to coal drier at furnace and heat for drying coal supplied from furnace stack. Conveyor system for handling both hard and soft iron to and from tumbling mills, also grinding department. Monorail system for unloading cars, making up charges and charging furnace. Approximately 80 per cent of castings made for own use. A complete line of garage equipment jacks mechanical and hydraulic. All types of truck and pleasure car jacks, mechanical and hydraulic, and electric hoist for greasing cars. Interesting castings include malleable hydraulic bases and tanks that operate under a pressure of from 10,000 to 12,000 pounds per square inch, small pinions for hand screw jacks, hydraulic Roll-A-Car 3¾ tons capacity, hand hydraulic 20 tons capacity.

WAUKESHA FOUNDRY Co., Waukesha, Wis.—Brass, bronze, aluminum, monel metal, nickel alloy castings. Crucible type oil melting furnaces. Large percentage of noncorrosive castings used in the fabrication of food processing machinery. Have made noncorrosive homogenizer heads to stand pressures up to 5000 pounds, ornamental castings and others from a fraction of an ounce to 1800 pounds. Specialize in food processing machinery. Employ six apprentices. Finished products sanitary milk and food pump, cast aluminum cooking utensils, special tank fittings.

ZENITH FOUNDRY CO.—Machine tool, gray iron and semisteel and general jobbing dies, etc., various alloys. Cupola melting furnace and sandslinger. Outstanding castings, pipe and automobile frame dies, hydraulic press platens and others weighing from 1 pound to 8 tons.

This year foundrymen will visit the various shops under more favorable conditions than prevailed throughout the foundry industry during the past four or five years. Practically every foundry is filled with men and filled with work, reminiscent to some extent of the conditions which prevailed at the time of the 1918 convention when Milwaukee and every other industrial center was rushed with war orders.

Many improvements and innovations in methods and equipment have been introduced in recent years. Discarding tradition and conservatism, Milwaukee foundrymen always have been in the forefront in the development and adoption of improved methods and equipment for the production of high class castings. The work of these men has exerted a profound influence in practically every branch of the foundry industry throughout the country. Thirty five years ago David McLain flouted tradition by deliberately adding steel to the usual charge in gray iron cupolas and proved that instead of being a detriment, this addition improved the physical properties of the resulting metal to an extent beyond the most sanguine expectations of former practice.

In former years when journeymen mechanics rambled over the country to a greater extent than at present, Milwaukee invariably was included as a definite point on the itinerary. Without exception the men increased their store of skill and knowledge while working in the progressive modern plants in this city. Later, many of these men assumed responsible positions in foundries throughout the country and introduced ideas on various phases of shop practice first promulgated in Milwaukee. To many of these men, now attending the convention of the American Foundrymen's association, a visit to a foundry in which they formerly worked will correspond to the visit of an old grad to his alma mater.

Experience has shown at every convention of the association, that the plant visitation program has proved exceedingly popular and has been taken advantage of by a great number of those in attendance. With the number of plants available in Milwaukee, this feature of the program this year undoubtedly will prove more attractive than usual.

MAYNARD ELECTRIC STEEL CASTING COMPANY

●

Carbon and Alloy Steel Castings

●

MILWAUKEE

Chicago St. Louis

For finish use

SMOOTH CAST

Ideal Silica Molding Sand

Ottawa District, Illinois

LUMP-FREE
TRIPLE SCREENED
BETTER VENTING
CLEANER CASTINGS

A Better Sand for a Better Finish

See Smooth Cast Kleen-Fast Sandblast and our uniform Pencor Sands at the A. F. A. Convention Hall.

GEORGE M. PENDERGAST & CO.

Foundry Sand Producers

MILWAUKEE CHICAGO UTICA, ILL.

"Where quality and satisfaction are paramount."

Front Page News for Gray Iron Foundries . . .

A New Book!

. . by John W. Bolton

"GRAY CAST IRON"

GRAY CAST IRON, presents in detail all the latest developments in raw materials, practices, metallurgy and engineering properties of gray iron castings.

The author, John W. Bolton, of the Lunkenheimer Company, Cincinnati, Ohio, is recognized as one of the outstanding metallurgists of the foundry industry.

Its 22 chapters discuss such phases as melting processes, casting defects, design, effects of regular and alloying elements, superheating, heat treatment, physical properties, machinability and wear, effect of temperature on mechanical properties, corrosion, and specifications.

Undoubtedly this new work will fill a long felt need for a complete discussion in one volume on the subject of gray cast iron. It is simply written and completely illustrated to be easily understood, even by beginners.

400 pages, 262 Illustrations

Cross index for ready reference

Bound in dark red cloth

Price, Postpaid $5.15

Copies of "Gray Cast Iron" may be inspected at Arena Booths 278-280 during the Foundry Show, where a complete selection of foundry books will be on display.

THE PENTON PUBLISHING COMPANY
Book Department
1213 W. 3rd St., Cleveland, Ohio

Milwaukee Convention City

(*Concluded from page* 102)

as compared with an average for the 13 largest cities in the country of 19.1. The percentage employed in calculation of these computations is based on a unit of 100,000.

The city recently completed a 750,000 gallon water purification plant in Lake Park on the shore of Lake Michigan. The municipally owned and operated water works supplies water to a total of 654,300 users, of which 599,100 are in the city proper and the remainder in outside communities.

A $13,000,000 sewerage disposal plant is reputed to be the pioneer activated sludge plant to be placed in operation in this country. It occupies an area of 58 acres, has a capacity of 160,000,000 gallons daily, serves a metropolitan district of 152 square miles with approximately 112 miles of main and intercepting sewers. During 1934 one third of the cost of operations was raised by the sale of waste sludge for commercial fertilizing purposes.

Milwaukee has the lowest crime rate and has less of a crime problem than any other metropolitan city in the United States. To illustrate: In 1933 the holdups numbered 112. In 1934 the reported score of these nefarious gents dropped to 65. Burglaries in 1933 numbered 918 and in 1934 they dropped to 842.

Perhaps the most remarkable improvement is shown in the stolen automobile situation. In which by the way the police records show a recovery of 97 per cent. In 1930, people with no proper regard for mine than thine, stole 2300 automobiles from the rightful owners, or part owners, depending on the number of payments still to be made. In 1933 the number of automobiles figuring in this section of the police records had dropped to 870 and in 1934 to 835. Not perfect of course, but on the other hand, not so bad, not so bad.

The statistically minded reader immediately will see that with a population of over 600,000 and with the usual American quota of one automobile per three members of the population, the stolen cars amount to, well, approximately four tenths of 1 per cent. What with one thing and another the word has kind of oozed around that Milwaukee is a good town for members of the underworld to stay away from. Conversely, it is a highly desirable dwelling place for the respectable permanent residents and a hospitable, friendly resting place for men of good intent, for the tourist, pilgrim or stranger within the gates.

Pride of the '80's

In the 80's, the pride and joy of Milwaukee, was the Iron Block, so named because the walls of the building were faced with iron castings. The Iron Block was completed in 1861 and is still standing at East Wisconsin Ave., and North Water St.

The idea for the building was conceived by the builder and owner, J. B. Martin, who, on a visit to New York, admired a building there in which iron was utilized as one of its chief building materials. When he returned to Milwaukee, he decided to build a block based on the structural features of the New York building.

Although still standing, the Iron Block was partly destroyed by fire in 1895. During the fire, the facings on the second floor became red hot. D. D. Badger & Co. was the firm that originated the architectural design and supplied the castings for the building.

Is Your Washroom a 1914 Model?

You Can Easily Modernize It ...and Improve Employee Morale

Note These Typical Bradley Users

Allis-Chalmers
American Blower Co.
Amer. Brake Shoe & Fdy.
Amer. Car & Fdy.
Amer. Steel Fdys.
Chicago Hdwe. Fdy.
Dayton Steel Fdy.
Erie M. I. Co.
Falk Corp.
Fittings, Ltd. (Canada)
General Motors
Hubbard St. Fdy.
International Harvester
Kewanee Boiler Corp.
Massillon St. Cstg.
Muncie Mal. Fdy.
Owens-Illinois
U. S. C. I. P. & F.
U. S. Metals Refining Co.

5 Showers Installed as a Single Unit

VISIT OUR BOOTH NO. 342

Look over the washing facilities that you provide for your employees—chances are they are wasteful of water, wasteful of time, and probably inadequate and unsanitary . . . You can modernize and save at the same time.

Bradley Group Washfountains are modern, clean, easy to install. They serve 10 at one time, yet use but little more water than one person at an ordinary wash basin. Water costs are cut over 70% and pay for these wash fixtures in a short time.

Each person is supplied with clean, sanitary running water—and with the low set bowl he can lean over and wash to the waist . . . Less piping and fewer piping connections mean easier installation and less maintenance.

No equipment will improve employee morale and good will as much as satisfying and sanitary washing facilities—Bradley Washfountains—and Bradley Group Multi-stall Showers that come to you as a single unit for quick installation.

Let us supply you with the names of hundreds of plants, large and small, that are using Bradleys—and our new Catalog No. 435. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee, Wisconsin.

BRADLEY

BRADLEY
WASHFOUNTAINS and SHOWERS

Dings

—Hot Separators Won't Separate

THIS is important to anyone considering the purchase of a magnetic separator. To the foundryman it means moulding sand of greater cleanness — more free from iron contamination than has ever been heretofore possible with any other magnetic separator—elimination of stray gaggers—better bond—uniform structure—better permeability—higher fusion point—finally, *more* good castings.

Separators are *not* all the same and Dings engineers have gone farther in developing features for cool separator operation than *any other manufacturer.*

Magnetic Pull is the result of current—the more current consumed the more pull, and the better the separation.

Dings design includes larger longitudinal and radial openings than on other separators, but more than this. It includes vanes on the sides of radial openings between pulley sections that assure *twice the heat radiating surface of any other make of pulley, size for size.*

This makes possible the use of more current without heating up—*and, of course, better separation.*

Don't buy a separator without investigation—come to Separator Headquarters and you will be reliably advised without any obligation on your part.

● *We invite you to visit the Dings Exhibit — BOOTH 133 — Milwaukee Foundry Show.*

DINGS MAGNETIC SEPARATOR CO.
675 Smith Street, Milwaukee, Wisconsin

Dings *High Intensity*
MAGNETIC SEPARATION

MAGNETIC CLUTCHES

Dings magnetic clutches solve many a clutch problem. They are simple, operate economically and without attention. Due to their great power and small size, they solve many a clutch problem where reduced space must be considered. They provide smooth engagement, will stop under overload and are particularly adapted to remote control and high speed drives or problems involving accurate synchronization. If you have a clutch problem, let us help you.

SEPARATION HEADQUARTERS SINCE 1899

SUCCESS IS BUILT ON EXPERIENCE

P&H OVERHEAD CRANES

FOR more than a half century, Harnischfeger has closely co-operated with the foundry industry—developing the most successful handling equipment. Through specialization and the most advanced manufacturing facilities, this organization offers you many extra advantages for which you pay no premium. P&H heavy-duty cranes for foundry service are offered in standard types to meet all requirements. Your inquiry will be handled by specialists who thoroughly understand your problems. For complete information on cranes and single line buckets, address the Harnischfeger Corporation.

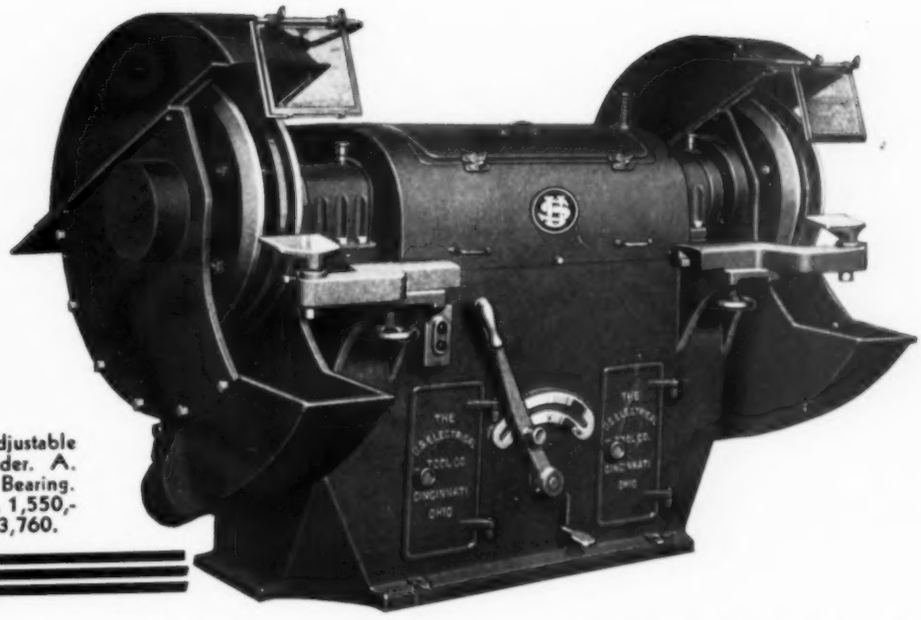
4405 WEST NATIONAL AVENUE MILWAUKEE, WISCONSIN

Warehouses and Service Stations: HOBOKEN — MEMPHIS — JACKSONVILLE — DALLAS — SEATTLE — LOS ANGELES — SAN FRANCISCO

53 YEARS OF LEADERSHIP

HARNISCHFEGER
CORPORATION

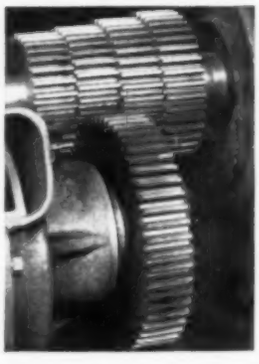
EXCAVATORS * ELECTRIC CRANES P&H HOISTS * MOTORS * ARC WELDERS



U. S. Adjustable Speed Grinder. A. C., Ball Bearing. Patent Nos. 1,550,712 - 1,923,760.

CHANGE SPEEDS *THE MODERN WAY . . .* just SHIFT the GEARS

Exclusive U. S. Feature Patent No. 1,923,760.



Modern speed control is brought to you in the Heavy Duty U. S. Floor Grinder pictured above. There are no belts or pulleys to wear out and the positive transmission of power eliminates belt slipping and power loss. As wheels wear down, the operator can quickly change to correct wheel surface speed, thus assuring maximum wheel life and efficiency. Speed change by shifting gears makes possible the removal of more metal in less time and at substantially lower cost.

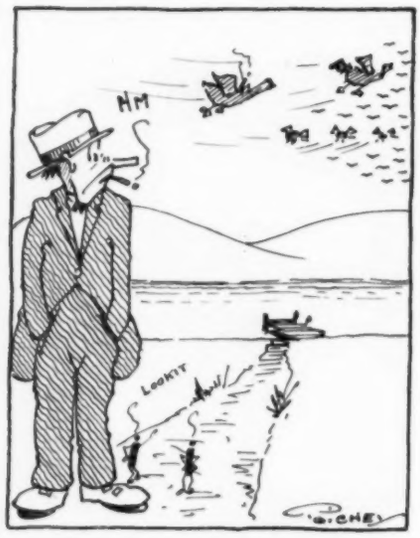
Your industrial jobber will gladly furnish you with full information and recommend the correct U. S. Drills, Grinders, Buffers, Polishers, and Flexible shaft Machines for your particular needs.

VISIT OUR BOOTHS NOS. 378-380-382

THE UNITED STATES ELECTRICAL TOOL CO.

THE STANDARD OF QUALITY
SINCE 1897

2486 WEST SIXTH ST. DEPT. 1 CINCINNATI, OHIO



The wild geese excite his envy

The Adventures of BILL

By PAT DWYER

DO YOU know," said Bill, "the more I think of the theory, the more probable or reasonable it seems to be. More evidence to support it and all that kind of thing. That is of course," doubtingly, "if there is anything in the theory in the first place. What do you think?"

"That is a kind of a stumbling block," I admitted, "but then on the other hand we all meet these stumbling blocks occasionally as we creep down the pathway of life. Mind you I don't claim that I can do it, but in all probability I might find some way of tunneling under, if I don't climb over the present specimen you have tumbled into the path."

"What do you mean, tumbled into the path?"

"Out of a clear sky you announce calmly that you favor a theory on some subject and then just as calmly ask me what I think about it. Of course I appreciate the compliment but I regret that I have not yet attained to that highly spiritual condition which enables me to read the mind, even the simple type of mind with which some people apparently are afflicted."

"Oh, well, this probably is over your head, but I shall do my best to put it into words of one syllable. The other night I read in the paper that some person had seen a flock of wild geese high up and heading north. That item suggested to me that man is descended from the birds and not—as erroneously set forth by certain authorities—descended from the monkey family. 'How come?' sez you. Here's how come. The birds fly north in the spring, and south in the fall. Well, sir, if I had my way, that is exactly what I should like to do. The old instinct is there."

"Well," I said, "I don't know what kind of a bird you are descended from and I am too polite to hazard a guess in public, but now that you have brought the subject up for discussion I am inclined to the opinion that your theory probably is correct. The migratory itch appears to be contagious.

"Quite a number of the boys are preening the feathers and starting to pack the golf sticks and a few other vital necessities for the jaunt to Milwaukee, where I have it on reasonably reliable authority, oral and printed, the American Foundrymen's association has the foundation down and a considerable part of the superstructure erected for the greatest and most attractive convention and exhibition in its long and honorable career of slightly over 40 years."

"Some day," Bill hinted darkly, "Some day you are going to do that once too often."

"Do what once too often? Go to Milwaukee?"

Don't forget your makeup box, gran'pa

"No. I was not thinking of Milwaukee or of whether you intend to go there or not. I imagine the town will continue to flourish in either case.

"No, sir. Some day you are going to jump off the conversational dock with one of them there long involved sentences dangling from your bill. Some of the verbs and nouns and adjectives and things will get tangled in the eel grass and, as the feller says, there you'll stay anchored to the bottom until Gabriel, the champion getter-upper, blows the long horn. In fact I am afraid you'll be moored so firmly fore and aft and amidships that they'll have to blast what's left of you loose with a few sticks of dynamite, instead of with a blast from a horn. Come to think of it, they might find it necessary to press the second horn blowing expert into service—."

"And pray, my good man, where do you find this second horn blowing virtuoso? Without exception, in all the references I have seen and heard touching on the stirring events of the last great day, Gabriel is represented doing a solo. I never have seen the score, and I do not know whether he uses an *E*-flat or a *B*-flat trumpet, but I am quite positive he has no oom-pah, oom-pah horn blower marking time in his wake. Come around some time when I have the time and the inclination to hunt up the -er -dope, and I shall show you a picture of this sterling Pi-fawn-ah, great wings spread to the breeze, doing his Wake-up solo act, Pos-it-ively for the last time, La-deez and Gen-tel-men, on this or any oth-tha stage!"

Bill was not impressed.

"While you're on the job," he said, "you might take another look around and you'll probably find the picture and maybe a few words on a

(*Continued on page* 120)

JANUARY 37
Perfect Cores . . .
every day in the year!
DAYTON CORE OIL eliminates guess work in the core room. Because of strict laboratory control and proper mechanical equipment necessary to produce quality materials every drum of each grade is always the same. This absolute uniformity assists in cutting core room and cleaning room costs and gives you perfect cores every day in the year. Start the year right. Test DAYTON CORE OIL on your hardest job and note results. We will gladly furnish sample
DOCO CORE WASH
OLD MASTER CORE PASTE
DOCO BINDER & CORE MOLD WASH
DOCO STEEL CORE & MOLD WASH
The DAYTON OIL CO. Dayton, O.
FEBRUARY 1937
MARCH 1937
APRIL 1937
MAY 1937
JULY 1937
SEPTEMBER 1937
THE DAYTON OIL CO.
DAYTON
CORE OILS
DAYTON, O.

AT THE SIGN OF THE RED AND YELLOW DRUM

— Milwaukee Convention,

Booths No. 335 and 337

We would like to meet and greet you in Milwaukee in May! Like to tell you more about *perfect cores every day in the year*—have you ask attending foundrymen what they think about our product . . . Here's to a good convention—a good time—and a *good* Core Oil! We'll be looking for you. . . .

THE DAYTON OIL COMPANY

DAYTON · · · OHIO

DON'T MISS THE STORY OF THE BIG SHOW

The May (Post-Convention) Issue of THE FOUNDRY

No issue of THE FOUNDRY throughout the entire year holds more interest and permanent value to our readers than the Post-Convention—this year the May issue.

To those who are fortunate enough to attend these great conventions and exhibits of The American Foundrymen's Association, the Post-Convention issue of THE FOUNDRY is an illustrated and accurate record of what they have seen and a souvenir of a pleasant week of renewing old acquaintances, making new ones and viewing the latest in foundry practice, equipment and supplies.

To those who find themselves unable to get away for "foundrymen's week," the Post-Convention issue of THE FOUNDRY *is* the Convention and even though they miss some of the "thrill of the crowd," they are just as well informed as to what happened; what's new in methods and equipment, etc., as those who are there. The reason for this is that the Post-Convention issue of THE FOUNDRY carries a detailed report of each session, summaries of the discussions, reports of the many active committees that are directing the technical trend of the industry, news of the daily happenings and official actions and a critical view of all that is new in foundry equipment shown at the exhibition.

As an advertising opportunity there is none more desirable. The eyes of the foundry industry of the world are focused on the A. F. A. convention and the entire foundry universe reads the Post-Convention issue with keen interest and an eager mind. Space reservations should be made at once.

The advertising forms of the May Post-Convention issue of THE FOUNDRY *close on May 4th.*

THE FOUNDRY ... CLEVELAND

Luxit
(TRADE MARK, REGISTERED)

The MONOLITHIC (One Piece) LINING

for **LADLES**
for **CUPOLAS**
for **BRICKSETTING**

ASK any of our regular customers about LUXIT. Chances are he can tell you a story much like the following. This is a "true story" by the way.

"Daily heat 130 tons. Ladles formerly lined with clay and fire-sand mixture two inches thick and lined daily. Now lined with "LUXIT" ¾ inch thick and run six to ten weeks without relining. This firm required 13 men pushing ladles around the shop. Now only 11 men are required due to the fact that the "LUXIT" lined ladles hold more iron and as the thermal conductivity is so much lower the iron is more fluid and holds the heat longer."

LIQUITOL:

For { Gray Iron Castings / Steel Castings / Special Steel Castings

A preparation which insures sound castings. Eliminates piping in castings. Heads reduced 40%. Eliminates cavities and porosity and greatly reduces scrap heads and runners.
Saves: Labor, Time, Money.

"SPEEDY" MOISTURE TESTER:

Enables you to ascertain moisture content of sand in a few moments. If the moisture content of your sand is required, you cannot do without this simple instrument to ascertain moisture at the sand pile. Ask for further particulars.

References from constant users of all our products gladly submitted. Write for literature.

Visit our Booth 326 at A.F.A. Convention in Milwaukee, May 3 to 7.

THE ALPHA-LUX COMPANY, INC.

192 Front St., New York City

PLANTS: Philadelphia, Pa.—Cicero, Ill.

(*Continued from page* 116)

lad named Joshua. Josh also had quite a bit of local reputation as a getter-upper and putter-downer. Equipped with only a ram's horn on one occasion he took a little prowl or pasear around the city of Jericho. He stopped every now and again to test his lungs and every time he blew a blast on the horn, a section of the wall came tumbling down. The wall around the city of Jericho may have been a jerry built wall, but jerry built or not, that's what I call real blowing!

"However, I doubt whether Gabriel and Joshua doing a duet on a pair of slip horns—slide trombones to you—as long as telegraph poles, could bring you up from the deep water, the mud and the eel grass

Illustration from Mary Johnson's famous novel "To Have and To Hold"

and all that kind of stuff.

"Reminds me of a story Tom O'Hara told me at the convention in Detroit last year. You know Tom?"

"Certainly, I know Tom. Worked with him years ago before he decided that selling core binder was more in line with his aesthetic aspirations than pounding sand. Charming fellow and—overheard among the ladies—notwithstanding his odd 200 pounds, as light on his dancing feet as a zephyr."

"Did you say zephyr or heifer? Well, never mind. The thought did occur to me that Tom is built more on the lines of the heifer's boy friend, usually in a certain tobacco advertisement, gazing insolently over the bars of a wood fence.

"According to this here now story, a gang of men was or were—take your choice—engaged in dismantling a steel bridge over the Erie canal. Every now and again one of the gang accidentally dropped a sledge hammer, a steel bar, a wrench or some other tool or piece of equipment into the water. Naturally, the pay envelope. That degree is just exactly zero. The gang jester penciled a few facetious and more or less ribald comments which aroused some amusement and mild comment. Taking the situation by and large as you might say, the usual reaction after a brief glance was the single word 'nuts!'

"Tools dropped into the canal day by day as usual.

"Finally, the boss got tough. He posted a notice to the effect that on and after that date, any tools lost in the canal would be charged to the men who dropped them.

"Here was a fine kettle of fish! Interfering with the freedom of the individual and all that kind of stuff.

"Some of the boys wanted to strike, but cooler heads prevailed even if the boss seemed to have 'em where the hair is short. For several days there was nothing to report in the lost and found column. The men stayed on the job and every tool was checked into the tool shanty at night.

"James Aloysius Geohegan—Skin for short—perched precariously on a narrow outboard plank, swung a 16-pound sledge with the greatest of ease and precision. His companion, Senor Jose Miguel y Santa Anna Flores Ponce de Leon—Spig to the boys—held a cutter against each rivet in succession.

"Along about this stage of the story," Bill halted to explain, "Tom paused for a moment to suck a little lemonade through a straw and to philosophize on the curious quirk of fate by which certain individuals widely separated at birth, become buddies later in life. Certainly at the christening ceremony 25 years before, the parents of James Aloysius in Dublin, and the parents of Jose Miguel, etc., in Seville, never imagined that the lads grown to man's estate as Skin and Spig, would be hand in glove whanging rivets from a beam over the Erie canal in the sovereign state of New York, U. S. A.

"Unknown to the two heroes of this plain, unvarnished tale, the plank gradually worked loose in the moorings. Finally, as James Aloysius swung his sledge in a mighty and graceful arc the plank dropped into the canal and naturally the men dropped with it and disappeared. Jose promptly came to the surface and swam ashore, but James failed to appear.

"Work was suspended on the job while the men went into a huddle on what should be done. Several were of the opinion that a man had the right to quit a job any way he pleased. If Skin chose to remain on the bottom of the canal, why, that was his undisputed privilege.

"Others thought he might have been stunned by the fall. Therefore his sojourn on the bottom was entirely involuntary. Far fetched of course and highly improbable, but still—well—at least he was entitled to the benefit of the doubt.

"Under hurried cross examination Jose stated that Skin had said nothing to him about quitting. This evidence was dismissed as immaterial and irrelevant. Men frequently quit on even shorter notice.

"The boss solved the problem with a long boat hook. He worked it around after the manner of an Indian manipulating an eel spear. He hooked James and dragged him to the surface from which a dozen willing hands lifted the water sogged bundle to the nearest staging. To the surprise of all he still maintained a firm and bulldog grip on the sledge hammer.

"Questioned on why he had not come to the surface if he was in possession of all his faculties, he claimed the hammer held him down. The gang gazed at each other in astonishment, held its collective

(*Concluded on page* 124)

The World's FIRST

Free Wheeling

with the DOUBLE EIGHT VIBRATION MOVEMENT

RIDDLE

ADAMS' FAMOUS FOUNDRY PRODUCTS

Backed by 22 years of successful vibrator and riddle experience. Built to service, fully Guaranteed. They make REAL MONEY for you!

MEET US AT THE 1937 FOUNDRY SHOW
Booth 13
Milwaukee Auditorium
May 3d to 7th

"RED" ELECTRIC VIBRATORS
Will pay for themselves in a single day's time.

"RED" ELECTRIC VIBRATORS
Lowest Operating Cost.
Adaptable to any Foundry plant.

"RED" ELECTRIC VIBRATORS
Gives cleaner Draws, better Molds, faster Production, Lower Costs.

A Great Step Forward in Foundry Efficiency

A Universal Portable Riddle that will earn its way in any foundry. The new "Free Wheeling" principle eliminates excessive bearing wear, insuring smooth operation and more effective vibration. The unique "Double-8" vibration movement (a throwing-chopping-riddling action) insures a better mix and temper to your sand . . . faster and better sifting, less time per batch, less cost per job. Improved Riddle weighs only 70 lbs., so that one man *actually can* handle it easily and hook it up anywhere. Overall height only 30 inches—permits sieves to be quickly tilted and dumped without being removed. Can be used with any foundry sand.

10 DAYS FREE TRIAL—PRICE

$150.00

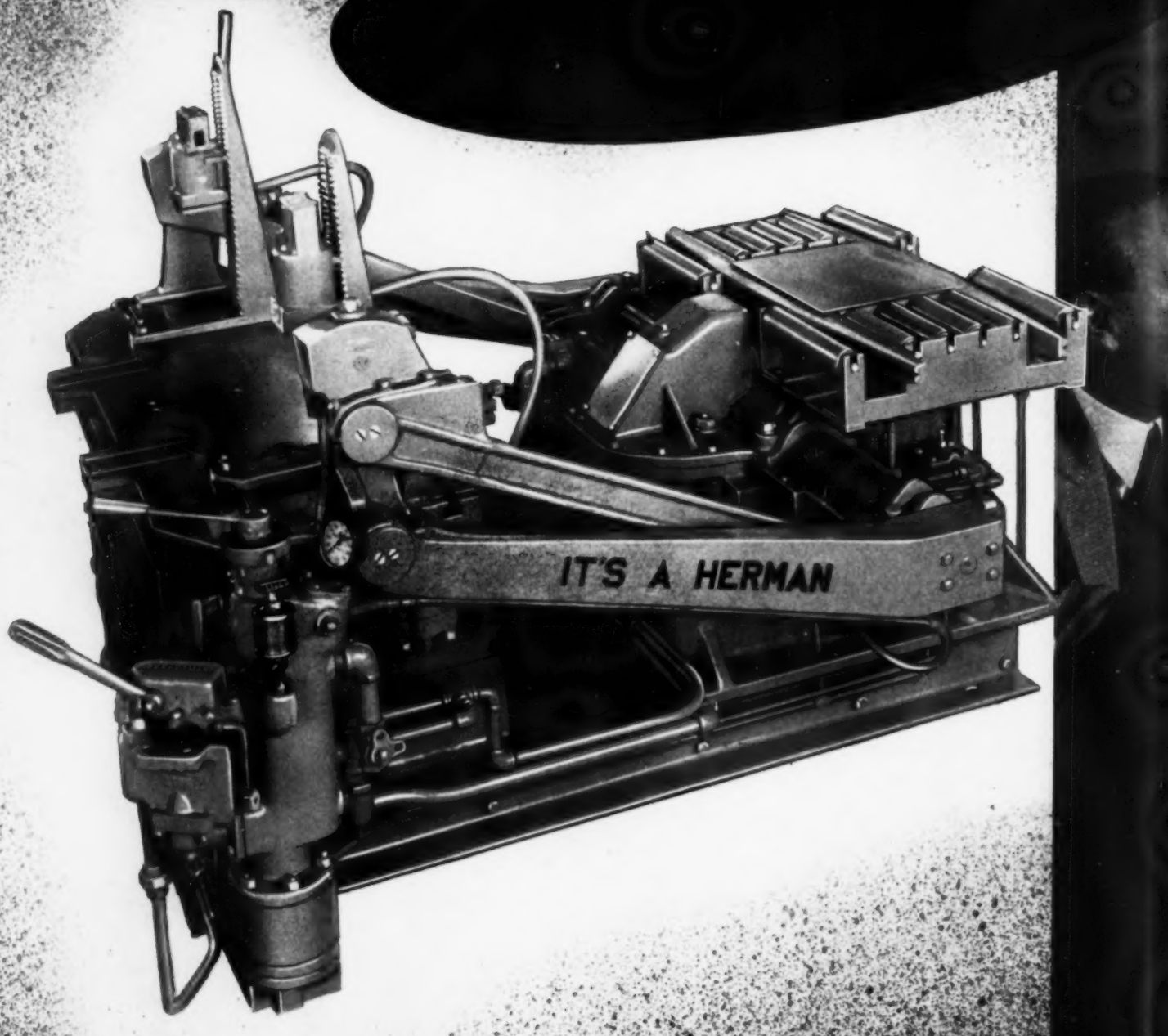
f.o.b. Chicago — 115 volt A.C. single phase, 60 cycles. For D.C. and 3-phase motors up to 230 volts, $7.50 extra.

NOW—the Universal Riddle equipped with a new all-steel bottom, with sifting cloth mounted in a special ring and instantly changeable.

FOUNDRY SUPPLIES MFG. CO.
2221 Orchard St.
Chicago Illinois

AT THE COMING CONVENTION

Many a hotel room discussion will center about the exhibit at Spaces 144, 164, and 165 in Mechanics Hall, where the NEW HERMAN PNEUMATIC MOLDING MACHINES will be put thru their paces daily. Much enthusiasm will be evinced over the performance of these machines, and justly so, for the HERMAN has established for itself an unique record in foundry circles. • The 750 lb. capacity, the 1500 lb. capacity, and the 4000 lb. capacity HERMANS will be exhibited at the show. • You are cordially invited to examine these new machines. Trained representatives will gladly make demonstrations and answer all queries.



HERMAN PNEUMATIC MACHINE CO.

PITTSBURGH, PA.

...AND DID YOU NOTICE THE SPEED WITH WHICH THAT HERMAN TURNED OUT A MOLD!
SURE, AND A PERFECT MOLD EACH TIME!
"If It's a HERMAN It's Worth Using;
It Made Its Way by the Way it's Made"
SPACES 144,164,165

(*Concluded from page* 120)

hands to high heaven and muttered in awed tones 'Holy jumpin' Thor!' The hammer held him down!'

"Clearly this was not a time for social amenities, dilly-dallying or mincing words. The shouted question was inevitable:

" 'Why in the hell didn't you let go the hammer?'

" 'Lave go iv it? An' git meself docked the price iv a 16-pound sledge. Not me!' "

"You will pardon me," I said, "if I fail to see the application of that story."

"I was afraid of that," said Bill, "James Aloysius still is wondering why the gang laughed."

Steel Castings For Stiff Service

(*Concluded from page* 50)

removed. They were then annealed at a temperature of 1600 degrees Fahr. Slow cooling in the furnace to 750 degrees Fahr. was required before permitting the casting to reach room temperature slowly. Cleaning, grinding, and finishing completed the process in the production of strong, wear resisting castings.

The pump impeller, Fig. 3, used in conjunction with the casings is 6 feet 6 inches in diameter, 33¼ inches deep, and weighs 8700 pounds. Special care was required in developing these units. Proper balance is an important factor.

In addition to the straight sections the 77-ton order of pipe sections included swivel, swivel elbows, and extension ladder types. All were 28 inches in diameter and had wall thicknesses ranging from 2 to 4 inches, dependent upon the pressure requirements at different locations throughout the line.

In service, all this equipment is subjected to unusual wearing conditions. The powerful suction of the dredge pumps draws in sand, rocks, mud, and water at high velocity, thus subjecting the castings to abrasion, impact and corrosion.

A.S.M.E. To Meet At Detroit In May

Plans have been announced for the 1937 semiannual meeting of the American Society of Mechanical Engineers, to be held May 17-21 at Detroit. Tuesday, May 18, will feature an afternoon session on apprenticeship. Talks will be given on "A Year of the New Apprenticeship in Detroit Industries," by Chester W. Culver, general manager, Employers' Association of Detroit, and "Organization and Growth of Future Craftsmen of America," by J. Lee Barrett, secretary, Detroit Committee for Future Craftsmen of America.

The keynote for Tuesday evening's session will be "Improved Methods of Fabrication." William S. Knudsen, executive vice president, General Motors Corp., will talk on recent developments in the basic processes of fabrication, including a discussion of casting.

Useful Facts About Gray Iron

Gray Iron Founders' society, 1010 Public Square building, Cleveland, has published a booklet entitled "New and Useful Facts About Gray Iron". Properties obtainable in the improved gray iron of today are listed and a definition of that type of casting is given. Under the general heading of specifications, the following subjects are emphasized briefly: Workmanship and finish; lightweight and thin sectioned gray iron castings; and automotive requirements.

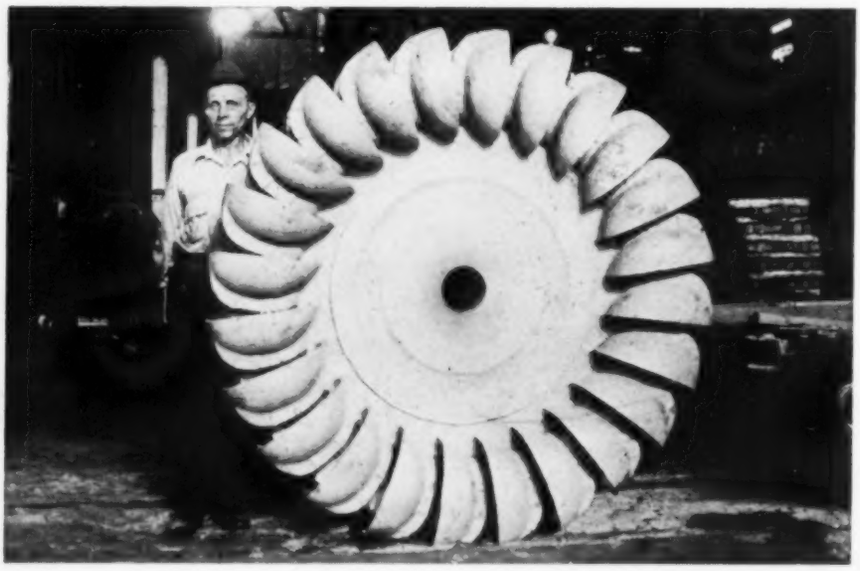
Nickel, chromium, molybdenum, copper and vanadium are treated briefly as to use, etc., in a section devoted to alloys. The four general classifications of heat treatment are presented and the booklet is concluded by a few words concerning the problems of gray iron casting.

Good Housekeeping Benefits Stressed

Dr. A. S. Gray, director of the bureau of occupational diseases, Connecticut state department of health, spoke on "Silicosis and Occupational Diseases" at the regular meeting of the Connecticut Foundrymen's association held March 16 at Hotel Duncan, New Haven, Conn. Dr. Gray outlined some of the results of the foundry survey being conducted in that state. He pointed out the advantages of educational handling of silicosis problems, stating that method is preferable to the compulsion necessary under a legislative program. He made suggestions toward the elimination of dust hazards and commented on the benefits of good foundry housekeeping. T. Joseph Judge, president of the association, presided.

"The Making of a Nation," occupying over 100,000 square feet of floor space, will be the central exhibit feature of Cleveland's new and greater 1937 Great Lakes exposition which will open May 29 and continue for 101 days. The exhibit will depict the social, agricultural and industrial development of America in one collective presentation of hundreds of working models, dioramas, raw material displays and 12 large murals by the famous artist Juan Larrinaga.

Casts 2-Ton Stainless Steel Wheel



THE impulse runner wheel shown in the accompanying illustration was produced recently at the Midvale Co. plant in Nicetown, Philadelphia, for the S. Morgan Smith Co., York, Pa. Wheel and buckets were cast integrally of low carbon, 13 per cent chrome stainless steel, heat treated to get a tensile strength of 90,000 pounds per square inch. The wheel weighs 3910 pounds and its overall diameter is approximately 72½ inches. The wheel is for use by the Puerto Rico reconstruction administration in a hydroelectric plant where water containing sand particles will be driven against it with great velocity.

Their low center of gravity — Wide wheel tread and short turning radius — Tremendous pulling capacity — Highly efficient spur-geared drive unit—All contribute to the economical hauling of materials. Use the coupon.

1. TRACTORS

An unusually versatile truck combining a heavy duty low lift platform truck with a crane of ample capacity.

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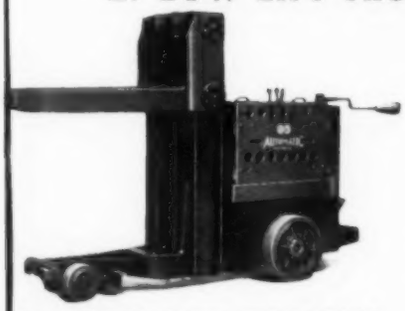

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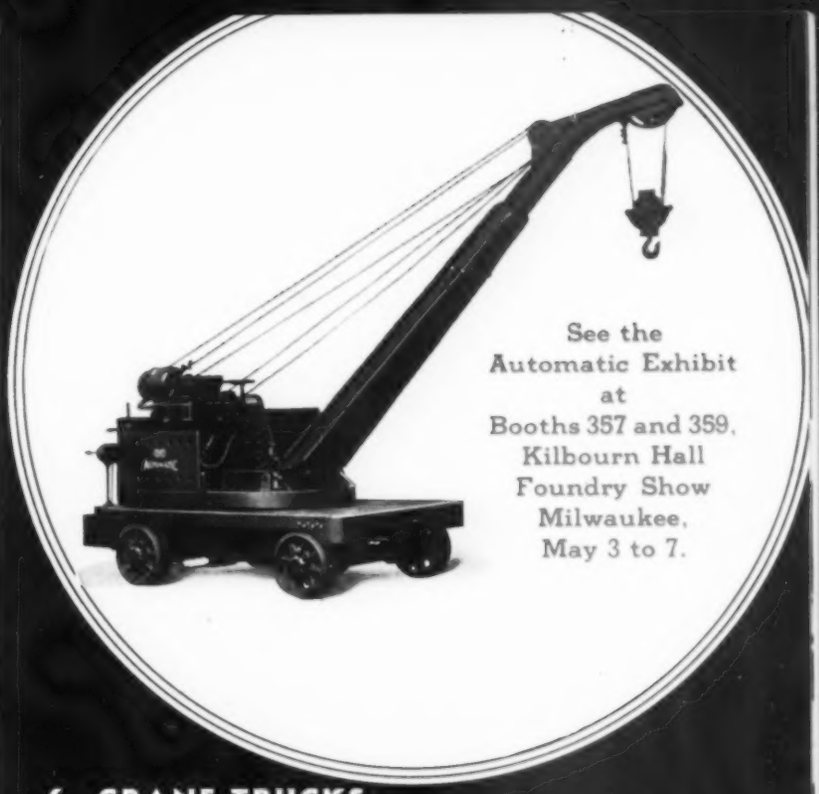

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Designed for stability and ease of handling under all load conditions—Three speed electric slewing of boom—Wider overside pickup radius — Larger tires — More rugged construction—Faster hoisting and running with absolute control of the load at all times — In capacities to five tons. Use the coupon.

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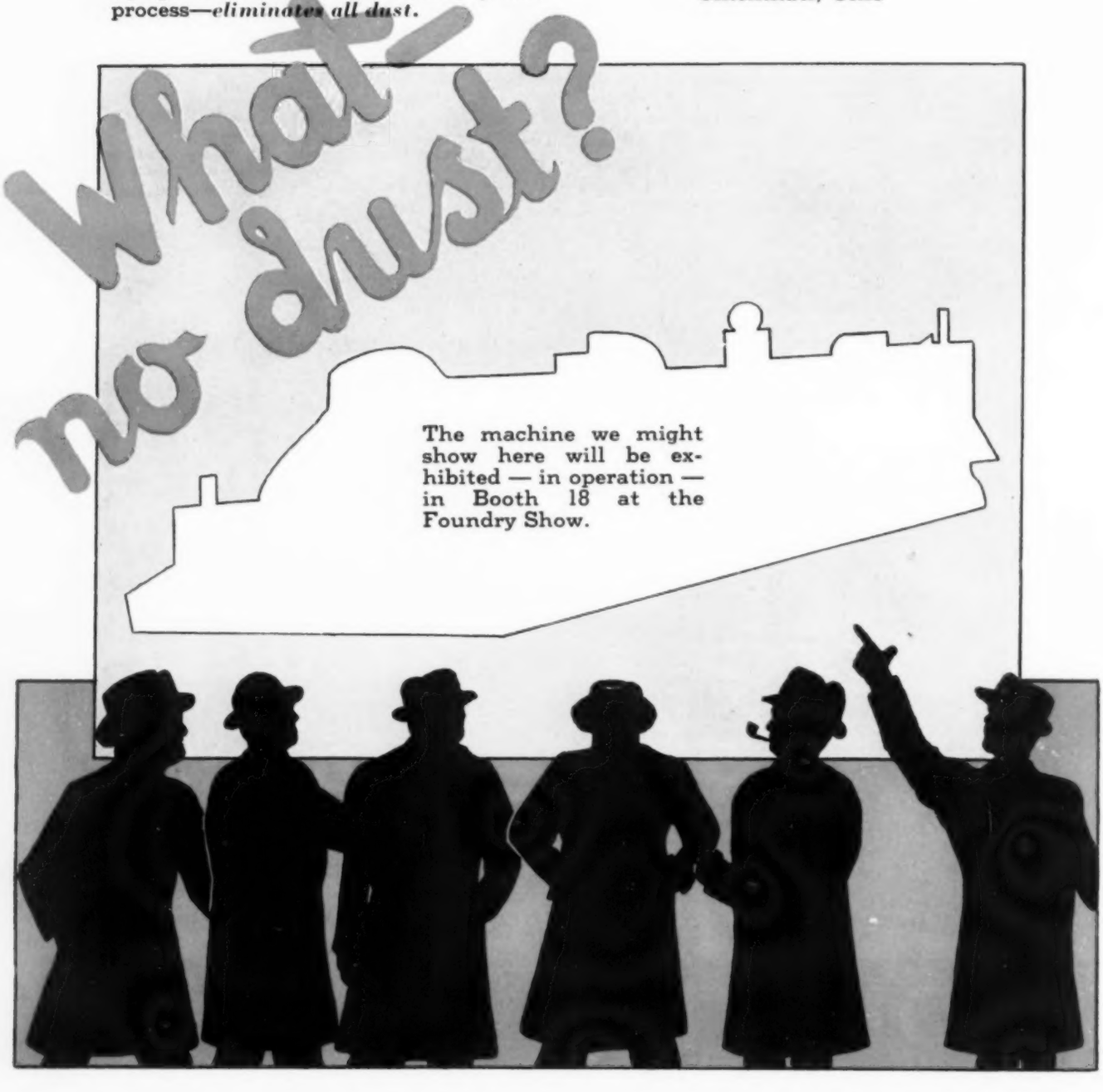

Metal Institute Holds Meeting

Elect Officers and Discuss the Age Hardening And Fatigue Resistance of Nonferrous Alloys

THE twenty-ninth annual general meeting of the British Institute of Metals was held in London on March 10 and 11, W. R. Barclay, Mond Nickel Co. Ltd., president, being in the chair. Mr. Barclay read a letter from the president of the American Institute of Mining and Metallurgical Engineers which carried an invitation to the Institute of Metals to hold a meeting in the United States in 1938, the month of October being suggested. The president announced at the meeting that the council of the institute had decided to accept the invitation for the year 1938. A similar invitation has been sent to the British Iron and Steel institute.

Officers Are Announced

The report of the council was then presented by G. Shaw Scott, secretary of the institute. It was reported that for the first time since 1931 there had been an increase in membership, the total number of members on the roll as at Dec. 31, 1936, being 2091.

The secretary next announced the election of the following officers for the year 1937-38: President, W. R. Barclay, Mond Nickel Co. Ltd., London. Vice Presidents: Eng. Vice-Admiral Sir Robert B. Dixon, London, and Lieut.-Col. R. M. P. Preston, Rio Tinto Co. Ltd., London. Members of Council: W. T. Griffiths, Mond Nickel Co. Ltd., London; Stanley Robson, National Smelting Co. Ltd., Bristol; A. J. G. Smout, Birmingham, and Dr. D. Stockdale, Cambridge.

Before calling upon the first lecturer to deliver his paper, the president announced that the May lecture would take place on May 5 in the hall of the Institution of Mechanical Engineers, Westminster, London, and that the lecture would be given by Professor Aurade on "The Flow of Metals." He further announced that the autumn meeting of the institute this year would be held from Sept. 6 to 10 in Sheffield, and that negotiations had already been started for holding the autumn meeting of 1939 in Glasgow.

The first technical session opened with a paper by Dr. Marie L. V. Gayler, National Physical Laboratory, Teddington, on "The Theory of Age-Hardening." The author put forward a general theory of age-hardening based on data relating mainly to the age-hardening of alloys of the duralumin type and of beryllium-copper and silver-copper alloys.

Age-hardening takes place by (1) diffusion, and (2) precipitation, the second overlapping the first. Both processes take place within wide temperature limits which are peculiar to every alloy system, i.e. the "temperature range." The limits of the temperature range are indeterminate, but approximations can be obtained for all practical purposes. If the temperature of ageing be close to the lower limit, both stages of the ageing will take place excessively slowly. If the temperature of ageing be close to the upper limit, the first stage will proceed so rapidly that its effect will not be detected. Each of the two processes is characterized by changes in physical properties which will present maxima, or minima, depending on the ageing temperature, the characteristics of the first being gradually replaced by those of the second. The softening which occurs when an alloy is aged at a higher temperature, after being previously aged at a lower temperature, is now explained in the light of the new theory.

Discusses Metal Spraying

The next paper was on "Metal Spraying: Processes and Some Characteristics of the Deposits," by E. C. Rollason, The University, Birmingham. The author described spraying pistols which use wire, powder and molten metal, and gave comparative details. He discussed the nature of the sprayed deposit and described a number of corrosion tests, using intermittent salt-spray, made on zinc and aluminum deposits and on painted zinc coats.

A paper entitled "The Effect of the Addition of Small Percentages of Iron and Silicon to a High-Purity 4 Per Cent Copper-Aluminum Alloy" was contributed by Dr. Marie L. V. Gayler. This paper covered the results of an investigation into the age-hardening of 4 per cent copper-aluminum alloys containing up to 0.6 per cent iron and 1.0 per cent silicon independently or together: These results may be summed up as follows: (1) The addition of 0.1 per cent iron inhibits ageing at room temperature, but not at higher temperatures, while the addition of 0.6 per cent iron reduces, to a marked degree, ageing at higher temperatures; (2) The addition of up to 1.0 per cent silicon does not inhibit the effect of 0.6 per cent iron; from a study of the constitution of alloys it would appear that the age-hardening which takes place at high temperatures may be attributed to precipitation of silicon as well as some $CuAl_2$ from the solid solution.

Aluminum Statue Described

A short paper was given by Prof. R. S. Hutton, Cambridge University, and Dr. Richard Seligman, Aluminum Plant & Vessel Co. Ltd., London, on "An Aluminum Statue of 1893: Gilbert's 'Eros'." This paper covers investigations made on the statue of "Eros" in Piccadilly Circus, London, which is free from serious corrosion after 38 years' exposure, and it was found that the statue is made of unalloyed aluminum. It is not possible to say whether the metal used in 1893 was produced by the old chemical or new electrolytic process, but the results of analyses of specified examples of old aluminum are reported in the paper. Following the presentation of this paper, Professor Hutton, who had just returned from America, mentioned that a certain part of a statue of Washington was also found to be made of aluminum and has been exposed to atmospheric conditions for about 30 years without showing much trace of wear.

The next paper was on "The Resistance of Some Special Bronzes to Fatigue and Corrosion-Fatigue," by Dr. H. J. Gough and D. G. Sopwith, National Physical Laboratory, Teddington. Fatigue and corrosion-fatigue tests on four types of special bronzes were carried out to ascertain the suitability of these materials for special aircraft purposes. The materials tested were: Phosphor-bronze, aluminum-bronze (10 per cent aluminum), beryllium-

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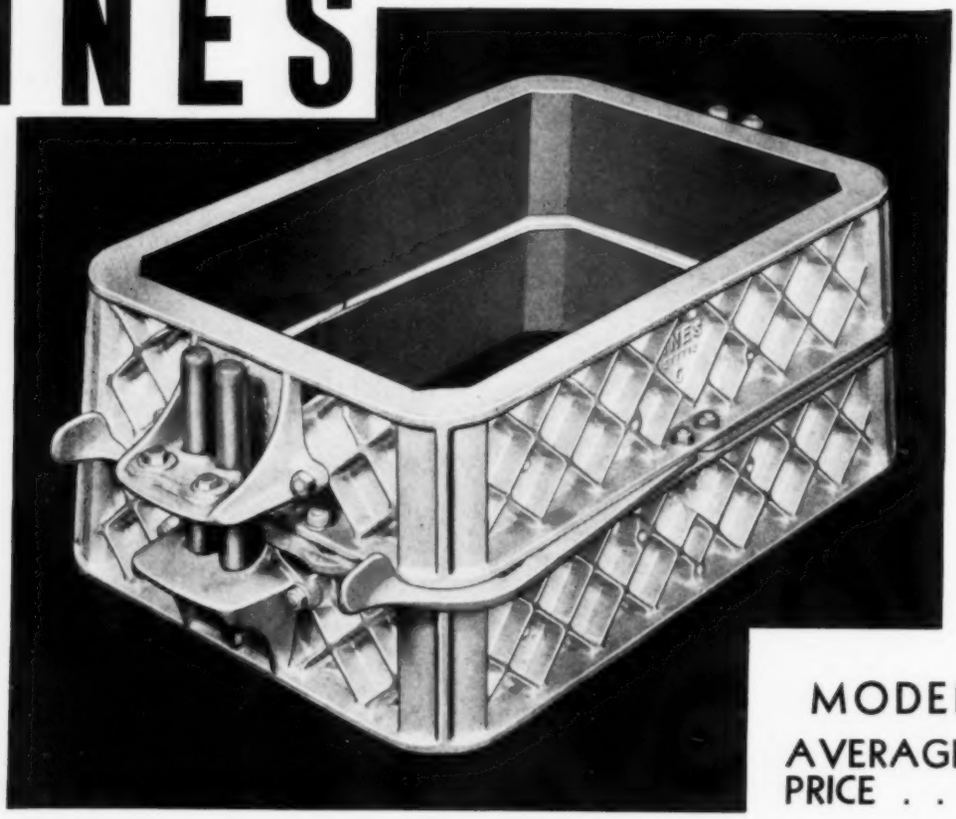

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A NEW ECONOMY—SHORT CYCLE MALLEABLEIZING

● Striking sharply at the basic cost of producing standard commercial malleable iron, the engineers of a large malleable iron foundry at Saginaw, Michigan, cooperated with Surface Combustion engineers in designing an entirely new furnace suitable for short cycle malleableizing. Contrasting a car-type furnace more than three times as long, this new SC Malleableizing furnace occupies a floor space approximately 20′ x 115′. Production of annealed castings is averaging 55 tons a day with a 30-hour cycle against the old cycle of 59 hours. Heat is applied by SC gas-fired *radiant tube heating elements.*

In the old style kilns, castings for automotive parts are packed in pots or boxes and conveyed through the furnace on car-type conveyors. In this new SC furnace a controlled atmosphere is provided protecting castings against scaling and excessive decarburization—eliminating the tare weight of packing, pots or boxes, and cars to be heated and cooled along with the net load. Savings effected may be reckoned on the basis that with the old method, only 25% of the total load to be heated was castings, while in the new furnace 75% of the total load heated is castings.

Surface Combustion engineers will be glad to give you further information on this type of furnace for either batch or continuous operation.

SURFACE COMBUSTION CORPORATION, Toledo, Ohio.

SURFACE COMBUSTION

Builders of ATMOSPHERE FURNACES and HARDENING, DRAWING, NORMALIZING, ANNEALING FURNACES for CONTINUOUS or BATCH OPERATIONS

(*Concluded from page* 127)

bronze (2.25 per cent beryllium), and Superston L189 bronze. The results show that the corrosion-fatigue resistance of the bronzes compare favorably with that of stainless steels, the beryllium-bronze in particular having the highest corrosion-fatigue resistance of any material so far investigated by the authors. The fatigue resistance in air of Superston is exceptionally high for a nonferrous material, but the material appears to be highly susceptible to stress-concentration effects.

In the discussion, A. J. Murphy, J. Stone & Co. Ltd., Deptford, London, S. E. 14, said that this was probably the first paper on corrosion-fatigue ever given before the institute, and added that the paper was welcome owing to the properties of non-corrosion of special bronzes.

On the morning of March 11 the final technical session opened with a paper on "The Control of Composition in the Application of the Debye-Scherrer Method of X-Ray Crystal Analysis to the Study of Alloys," by Dr. W. Hume-Rothery, Royal Society Warren Research Fellow, Oxford, and P. W. Reynolds, Jesus College, Oxford. This was followed by a paper entitled: "Alloys of Magnesium. Part IV—The Constitution of the Magnesium-Rich Alloys of Magnesium and Silver," by R. J. M. Payne, and Dr. J. L. Haughton, National Physical Laboratory, Teddington.

Another paper, by Dr. W. Hume-Rothery and Ewart Butchers, Keble College, Oxford, was on "The Solubility of Silver and Gold in Solid Magnesium," and a contribution by Dr. J. L. Haughton and T. H. Schofield, National Physical Laboratory, Teddington, was entitled: "Alloys of Magnesium. Part V—The Constitution of the Magnesium-Rich Alloys of Magnesium and Cerium."

Newer Refractories Are Discussed

The more severe requirements for refractories, resulting from technical advances of the foundry industry, were discussed at the March 12 meeting of the Metropolitan Philadelphia Chapter of the American Foundrymen's association. Held at the Engineer's club, the meeting was featured by an address by Louis J. Trostel, chief chemist, General Refractories Co., Baltimore. His talk covered "The Newer Refractories in the Nonferrous and Ferrous Industry as Applied to Casting."

Mr. Trostel described various refractories, including super duty fireclay brick and crystalline base refractories, and referred to outstanding improvements in standard products.

Michail M. Dorizas of the University of Pennsylvania talked on "The Problem and Challenge of Soviet Russia" as an after-dinner feature of the meeting. The lecture was illustrated by motion pictures of his extensive travels through Russia.

Discuss Equipment At Rockford

Three speakers featured the Northern Illinois Foundrymen's association meeting held March 9 at Schroms cafe, Rockford, Ill. Edward G. Borgnis, International Molding Machine Co., Chicago, spoke on "Molding Machines;" W. J. Knapp, Modern Equipment Co., Port Washington, Wis., discussed "Foundry Equipment," and A. H. Reed, A. P. Green Co., Mexico, Mo., dealt with "Manufacture of Refractories."

Mr. Borgnis traced developments of the molding machine from the first patent issued in 1812 on a house-raising-screw, to the present day. The stripping plate was brought into use after 1886. Mr. Borgnis gave an interesting description of special molding machine installations and concluded with remarks about his recent trip through Europe. He called attention to the German practice of casting bath tubs one-eighth inch thick so that several units can be stacked together and crated.

Mr. Knapp exhibited a number of large photographs of covered and insulated ladles. He stated that the first attempts to cover and insulate ladles were made in 1925 and 1926. Mr. Knapp discussed tests and installations where insulated ladles had been utilized and expressed the opinion that in the near future pouring temperatures would be specified for individual jobs.

Mr. Reed pointed out important features of the manufacture of refractories and showed two reels of motion pictures covering all phases of brick making including the dry press and stiff mud processes and the manufacturing of special shapes. The method of storing and handling fire clay was discussed and illustrated by the speaker.

Moves Headquarters

E. Leitz Inc. has moved its headquarters in New York from East Tenth street to the Heckscher building, 730 Fifth avenue. A large display room and a projection and demonstration room are part of the new location, in addition to a machine shop for repair and service.

Milwaukee Probes New Machinery

The Milwaukee Chapter of the American Foundrymen's association held its regular meeting March 19 at the Schroeder hotel. A floor show, seven speakers and special entertainment were features of the program which was presented to an audience of 175 men. Various aspects of the subject, "New Developments in Our Industry," were covered by the speakers during the course of the evening. Discussion covered ventilation, refractories, blasting, dust suppression, hammers and melting furnaces.

Willard Roloff, Aerovent Fan Co., gave an interesting talk on foundry ventilation. A. S. Nichols, Illinois Clay Products Co., spoke on clays for bonding materials and improved methods of manufacturing fire brick. A. L. Gardner, Pangborn Corp., showed moving pictures of the company's new airless blasting machine. W. E. Naylor, Beardsley & Piper Co., displayed slides of recent installations at the Ford Motor Co. Paul Cnare, Claude B. Schneible Co., discussed further developments in dust suppression equipment. J. E. Johnson, Independent Pneumatic Tool Co., spoke on pneumatic hammers. J. L. Stroman, Fisher Furnace Co., showed slides of various types of brass and aluminum melting furnaces.

The floor show and special entertainment were provided by the supply and equipment men of the chapter. William F. Bornfleth presided at the meeting.

Mold Reproduces Detail

(*Concluded from page* 51)

while the plaster mold is still fairly warm. As soon as the brass solidifies, it is removed, and if desired several other brass molds may be made from the same plaster positive. A flat cope of brass is made for closing the mold.

Possibly instead of going to the trouble of making a brass mold, one might try pouring the small castings to be made in a plaster mold. That would eliminate several steps, but plaster is fragile, and perhaps could only be used once. If one wishes to try that procedure, the plaster-asbestos mixture is employed directly on the master pattern. That mold, as in the case of the plaster positive, should be raised to a red heat to remove the moisture. It also should be used while still warm because, if allowed to become cold, the plaster tends to absorb some moisture, and the metal will kick.

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Special analysis metal, CHILLED to make it HARD: HEAT-TREATED to make it TOUGH and accurately graded to uniform size by special equipment—

You can SEE the difference in quality.

You can PROVE the longer service and faster, better work IN YOUR OWN CLEANING ROOM.

The handy hundred pound bags are easy to handle and the abrasive is always ready to use.

Lower Cost Per Ton of Castings Cleaned

is the final clinching reason why so many use American Steel Abrasives.

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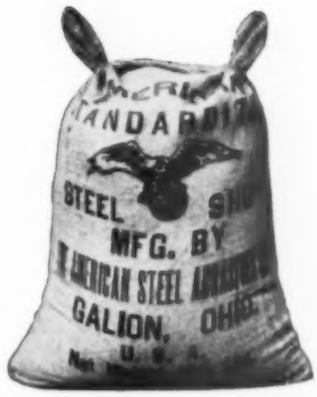

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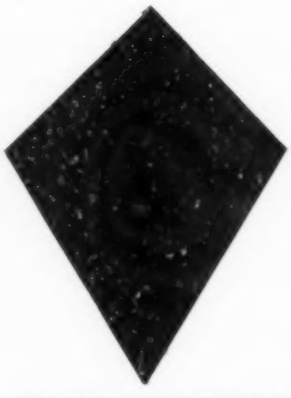
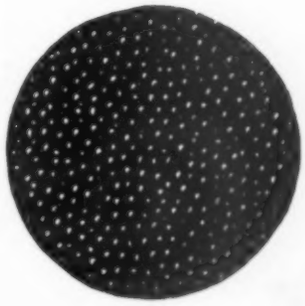
Cleans by peining hammer action, removing sand and scale very rapidly and leaving a clean ALL-METAL surface. Hard and Tough—Uniform in size, positive in action, Standardized Steel Shot lasts a long time, with very little dust or spent abrasive. Accurately graded to 16 standard sizes.

We'll gladly supply samples, prices, further information.

The American Steel Abrasives Co., Galion, Ohio



In the new Airless Blast Cleaning Machines, American Steel Abrasives are giving best results because of their HARDNESS, TOUGHNESS and UNIFORMITY.



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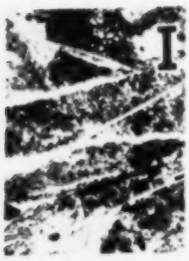

IN well made Ferro-Alloys, as in well made steel, there is something beyond just mere analysis; something that gives them a character that is a part of those who made them. Superiority can always be distinguished.

In Philo Brand Ferro-Alloys you will find there is a quality and integrity, representative of and individual to the *Ohio Ferro-Alloys Corporation.*

For almost every Silicon and Manganese requirement in the iron and steel industry there is a Philo Brand Ferro-Alloy to meet the most rigid specifications; a Philo Brand of special quality in the Standard High Carbon Ferro-Chromium and a particularly Low Melting Philo Brand Silico-Chromium Alloy.

Ohio Ferro-Alloys Corporation, Canton, Ohio

FERRO PHILO ALLOYS

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ASIDE from putting every effort into making Ferro-Alloys well adapted for producing quality irons and steels, it is the desire and aim of the *Ohio Ferro-Alloys Corporation* to be of real assistance to the producers of iron and steel in meeting the ever growing demands placed upon them by competition and the advancement of the consuming industries.

"Change is, after all, the most consistent and characteristic quality of business. New inventions and discoveries lead to the obsolescence of older processes and methods. Competition forces improvements and short cuts."

During the past twenty-five years a great many changes have taken place in the iron, steel and alloy industry. Through all of these changes, however, the Ferro-Alloys of Manganese, Silicon and Chrome have always retained their important positions. The manner in which they have been used in the various processes or methods of manufacture of iron and steel has varied considerably, and will continue to vary in order to meet a wider diversity of products and stricter requirements.

The representatives of the *Ohio Ferro-Alloys Corporation* are well equipped to assist in obtaining satisfactory solutions to problems facing users of Ferro-Alloys. Their service is based upon constant association with such problems, and upon past experience in the actual production of iron and steel.

To you they offer, in good faith, whatever service your problems demand.

"Nothing in the world can take the place of intelligent persistence. Talent will not; Nothing is more common than unsuccessful men with talent. Genius will not; Unrewarded genius is almost a proverb. Education will not; The world is full of educated derelicts. Persistence and determination are omnipotent. The slogan 'PRESS ON' has solved and always will solve the problems of the Human Race."—Calvin Coolidge.

Ohio Ferro-Alloys Corporation, Canton, Ohio

Make Progress in Reduction of The Wear of Metals

MUCH has been accomplished in reducing wear of metals according to a symposium on this problem held under the auspices of the Philadelphia district committee of the American Society for Testing Materials at the Engineers club, Philadelphia, April 5. Better selection of materials for the purposes required, redesigning of equipment in many cases, improved lubrication, and closer study of general operating conditions have contributed to this advancement through observation based on experience and refined method of laboratory testing.

Discuss Various Viewpoints

Wear of metals was discussed from various viewpoints—railroad, automotive, power equipment and textile industry. Dr. H. W. Gillett, Battelle Memorial institute, Columbus, O., presented the general aspects of the problem, and D. E. Ackerman, The International Nickel Co., Bayonne, N. J., prepared a paper on some important variables in wear tests on cast iron which in his absence was presented by Mr. Wise of the same firm.

Two sessions, both well attended, were devoted to the symposium, with G. H. Clamer, Ajax Metal Co., Philadelphia, presiding at one and A. C. Fieldner, president of the society and chief, technologic branch, United States bureau of mines, Washington, D. C., at the other.

While much has been achieved, the general study of wear and methods of combating wear has still a long way to go, according to Dr. Gillett, who believes that time, and time alone, will have to supply many of the answers to present problems.

Early in his discussion, he defined his conception of wear. "Wear of a metal part," he said, "is its undesired gradual change in dimensions in service under frictional pressure." This, he explained, draws no hard and fast line between the first stage of wear, involving mechanical deformation, and the removal which follows. It admits such failures as those of battered rail ends and wiped bearings even should the dimensional change occur without loss of weight, as long as the failure occurs gradually.

Continuing, he said that the action of corrosion, concomitant with abrasion, cannot be wholly divorced from wear, and, just as mechanical deformation of the surface may preceed removal, so may chemical change of the surface be followed by removal of corrosion products and the corroded layer.

He said it was important to know what happens to the metal debris resulting from wear, and to extraneous grit. This loose material may be swept off into the lubricant, or it may embed itself into one of the parts and act as a lapping medium. He also pointed out that the manner in which the particles wear off, whether by splitting along cleavage planes or individual crystals, or by tearing out of whole crystals along grain boundaries, has its influence on the type and rate of wear.

Discussing simulated service tests, Dr. Gillett said the most reliable ,although the most expensive, are those that place a full size piece of the equipment concerned into the laboratory and put it to actual use under known and recorded conditions.

Need an Understanding

Efforts to develop a standard wear test at this time would not prove profitable, he believed. An understanding of the mechanism of wear in a particular service is perhaps the best guide to a satisfactory test, he contended, adding that more attention to the fundamental mechanisms of wear and to designing apparatus that reproduces the particular ones that hold in the service in question will be more fruitful than will the "blind adoption of some 'standard' wear test that does not truly represent the case."

Experiences gained in the course of a program to develop a laboratory test which would yield reasonably reliable indications of the level of wear resistance of different cast irons and to apply this test to commercial cast irons were contained in the paper prepared by Mr. Ackerman, International Nickel Co., and presented in his absence by Mr. Wise, of the same company.

A technique was devised in which proper control caused a series of runs of short duration to approximate a continuous, long time test, and the machine used was a standard product of Alfred J. Amsler & Co., Schaffhaus, Switzerland, modified in one or two respects, and described in some detail. Gray iron, plain chilled and nickel-chrome chilled iron were among the types of specimens experimented with.

Temperature measurement and temperature control, oxide formation and torque characteristics, and prevention of friction oxidation were included in the phases discussed. Comparative tables and much similar data were presented.

Data Are Lacking

The author spoke of the paucity of data as to the real nature of wear, and, in line with Dr. Gillett, indicated that it seemed unlikely that a testing machine satisfactory for general purpose use can be devised. "For the present", he warned, "wear tests must be conducted with great care and the results of such tests must be interpreted with caution."

Much redesigning of equipment and many changes in materials and finishes have been made by machinery builders in their efforts to meet the especially complicated problems of wear in the textile industry, according to Albert Palmer, Crompton & Knowles Loom Works, Worcester, Mass.

Mechanical changes, he said, have been made in the interest of reducing shock loads, increasing bearing areas, providing more accurate assemblies, improving running fits of parts, providing locking devices to eliminate maladjustment resulting from vibration, and making provisions for better lubrication, the latter including the proper placing of oil grooves and lubrication fittings, as well as the selection of suitable lubricants.

With respect to finishes, Mr. Palmer stated that through new designs and the use of new machine tools, the parts are assembled more securely and accurately and have finished surfaces at the points where relative motion takes place.

The recent trend in alloy cast irons, he said, has been toward the

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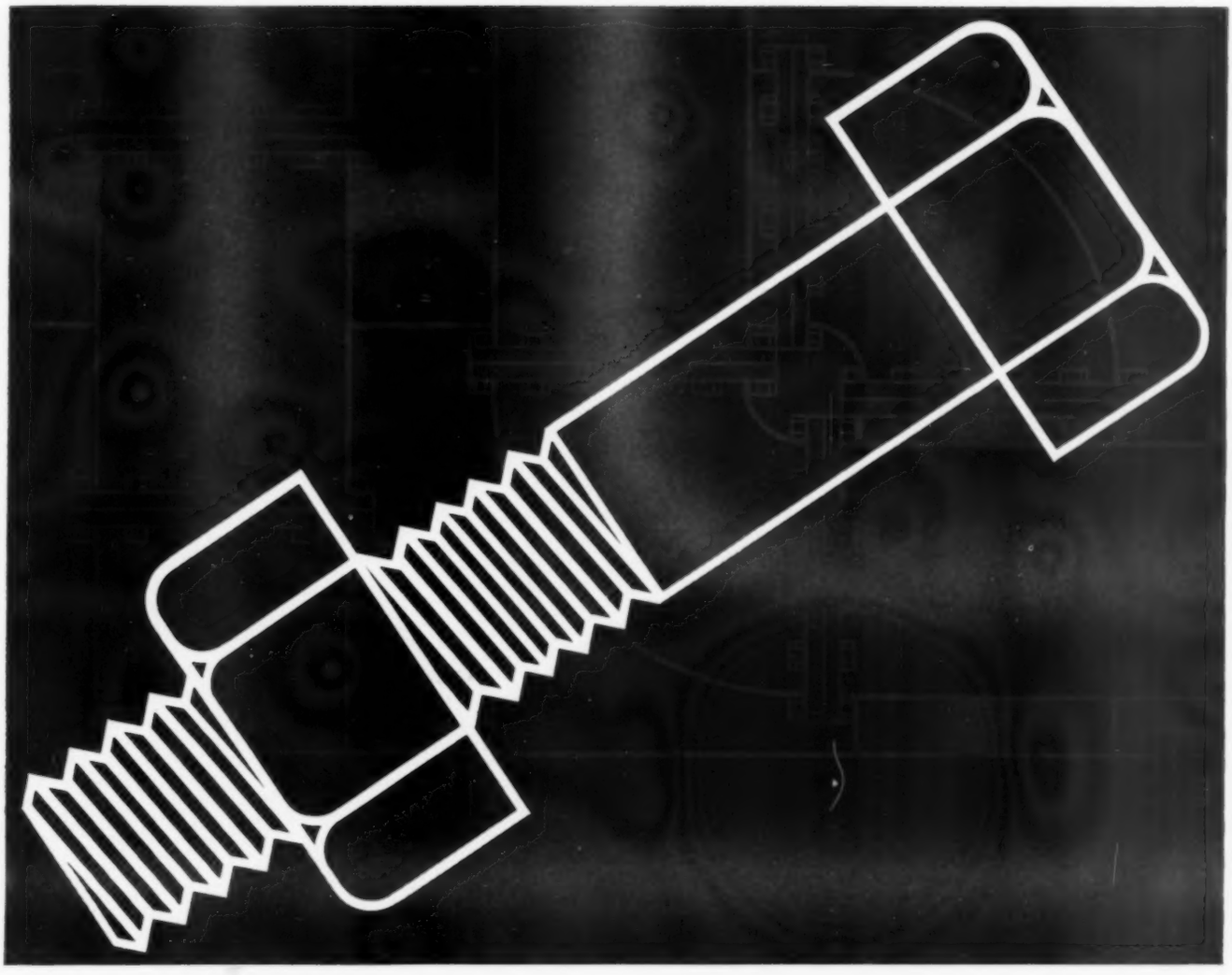

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ONE bolt is small, and comparatively inexpensive—either to buy or to make. But—bolts "in the mass" can easily represent a very considerable outlay. The saving of even a small fraction of a cent in the production cost may come to a substantial sum in the aggregate.

For example: One concern has standardized on Chrome-Moly (SAE 4140) bolts because they are easier to machine—resulting in savings on both tool expense and machining time. In addition, their improved physical properties assure better service performance.

Moly steels are cutting production costs throughout industry because they are more economical to fabricate—whether the process be heat-treating, forging, carburizing, or machining. . . . They also impart to finished products higher quality, resulting in better service.

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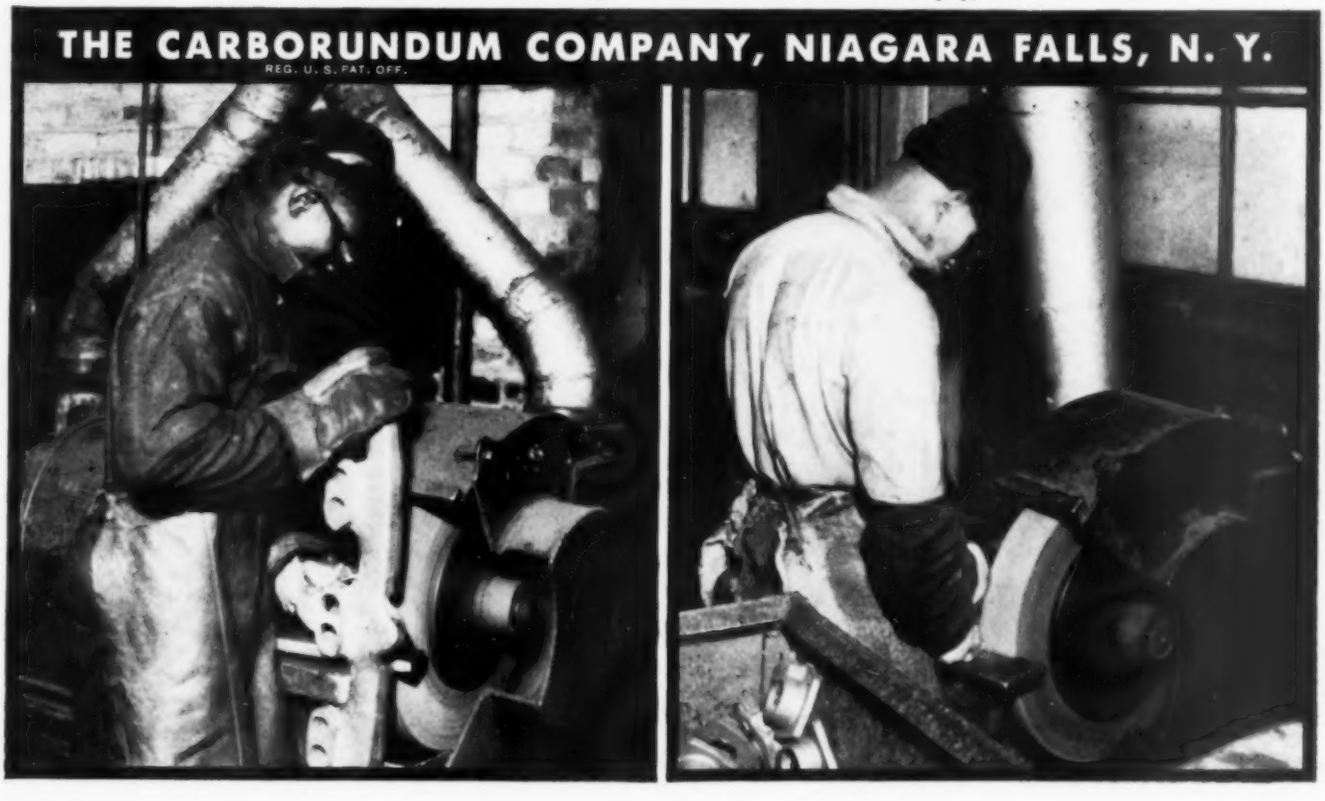

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(*Continued from page* 134)

use of such elements as chromium, nickel and molybdenum. Materials of various characteristics are employed, some because they are denser and stronger than regular gray iron, some because they are tougher and more resistant to impact and some because through heat treatment they can be made as resistant to abrasion as chilled gray iron.

Mr. Palmer cited numerous examples as typical of problems of wear in the textile industry with natural variations according to type of equipment. For instance, he said, in preparatory machinery such as openers, pickers are cards, the wear problems result from high speeds combined with weight. In slubbers, roving frames, spinning frames and twisters, high speed and small bearing areas are involved. In warpers, high speed, great weight and sudden stopping are the sources of difficulty. In slashers, the speed is low, but weight and high temperature are present.

The wearing effect of these inherent characteristics is increased greatly, he said, by the conditions under which the machinery must operate.. There is the extra humidity necessary to forestall practically insurmountable difficulties with the fabrics. Lubrication especially is complicated because of the danger of oil spots on the fabric. Lint from the yarns complicates cleaning, and, in turn the wear problem.

N. L. Mochel, Westinghouse Electric & Mfg. Co., Philadelphia, discussed several interesting examples of wear on power equipment and means for combating such action. He referred to some laboratory tests which have been particularly effective, including one on erosion that has given excellent service, he said, in predicting the life of the turbine shield and blade materials in service.

In steam turbine construction wear problems have resulted in various changes in the materials used. Shields for turbine blades, as now used by Westinghouse, are No. 6 Stellite, of the following composition: Cobalt, 55 per cent, minimum; chromium, 27—33 per cent; tungsten, 3—6 per cent; and other elements, maximum, 6.5 per cent. Sealing strips, formerly of brass, are now, with the higher temperatures employed, a low carbon, 13 per cent chromium steel, containing 0.5 per cent molybdenum. Heat treated high carbon chromium steel, having 1.70 per cent carbon and 18 per cent chromium, with a "C" Rockwell hardness of 43 is now standard material for steam inlet valves and low carbon, 13 per cent chromium steel, sometimes hard-faced at the point of contact, is being used for the valve seats.

For throttle valves the use of nitrided steel bushings with stems of either 20 per cent nickel—7 per cent chromium steel or low carbon 12 per cent chromium steel gave satisfactory results for years, but today higher temperatures have forced the development of new combinations Mr. Mochel said.

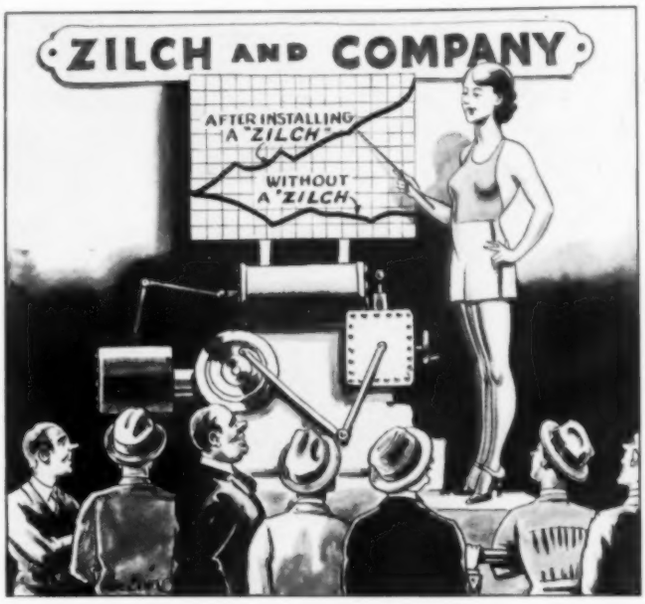
A laboratory set-up for testing valve stems and bushing materials under steam conditions very closely approximating service conditions has been very valuable in indicating the necessary changes, he added.

An interesting and important item of wear in the hydraulic turbine, he said, is the serious pitting of the blades in the turbine runner by what is known as cavitation attack. Runners usually are made of plain cast steel and the repairing of the pitted areas by arc welding with 18-8 chromium nickel steel has led to excellent results, he stated.

Higher operating speeds for railroad equipment have stressed the need for greater wearing materials, according to L. W. Wallace, Association of American Railroads, Chicago, who described tests conducted on various railroad materials such as rails, locomotive car wheels and certain other equipment parts. Mr. Clamer presented an interesting review of extended and elaborate investigational tests on journal bearings, going back a number of years to a presentation he made before the Franklin institute, Philadelphia, in 1903.

Results of a series of tests conducted upon various parts entering into automobile construction, including automobile connecting rod bearings, gears, cylinder bores and piston rings were submitted by W. E. Jominy, metallurgical department, research laboratories section, General Motors Corp., Detroit. He gave considerable detail with respect to testing equipment used and the nature of the wear which usually was encountered in the various parts tested. Among points emphasized was that coarse grained cylinders resisted wear much better than those of fine grain. The larger grained iron held the oil film considerably better and there was a lower modulus of elasticity, it was suggested by Mr. Jominy. The annual meeting of the society will be held in New York, June 29 to July 2.

Faked Foundry Facts

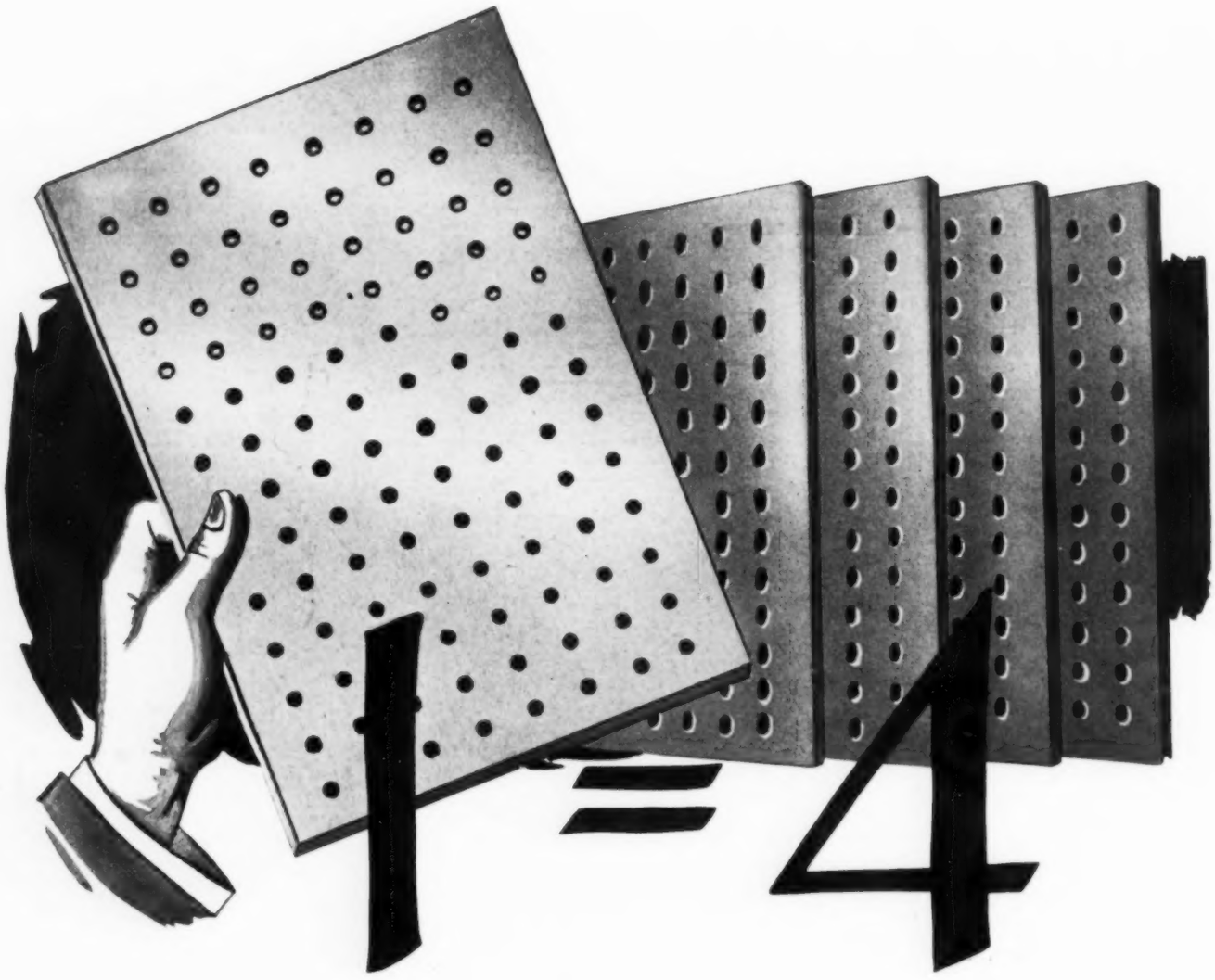


Production Curves

Feature Alloy Iron At Vancouver

A. G. Zima, Pacific coast representative of the development and research division, International Nickel Co., New York, addressed the Engineering Institute of Canada on "The Role of Nickel in the Development of Modern Cast Irons," at its March 9 meeting in Vancouver, British Columbia. His discussion centered on the improvements made in properties of cast iron by nickel additions. Mr. Zima emphasized grain structure, machinability and uniform hardness. Heat treatment characteristics of various cast irons also were dealt with by the speaker.

Mr. Zima pointed out properties and uses of special types of nickel alloy cast irons. These included castings requiring hardness or subject to abrasive conditions, that possessing resistance to corrosion and growth, scaling and warpage and the type used for gears, valves, frames and machine tool spindles.



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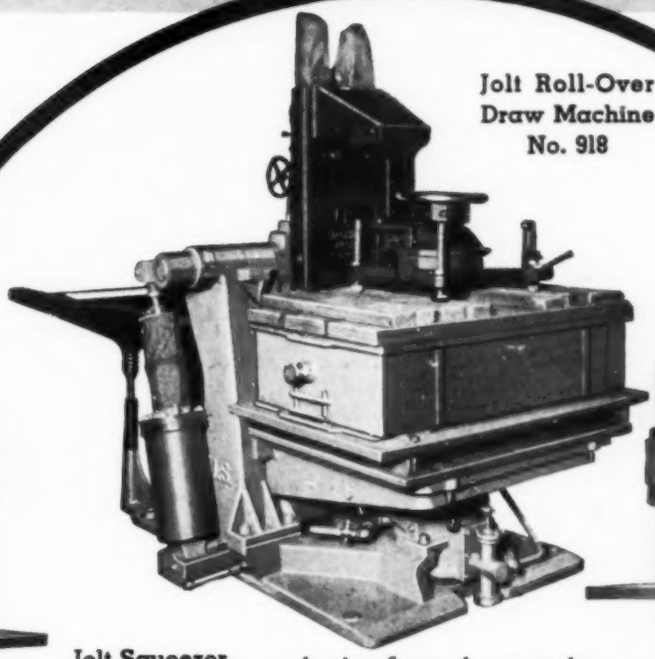

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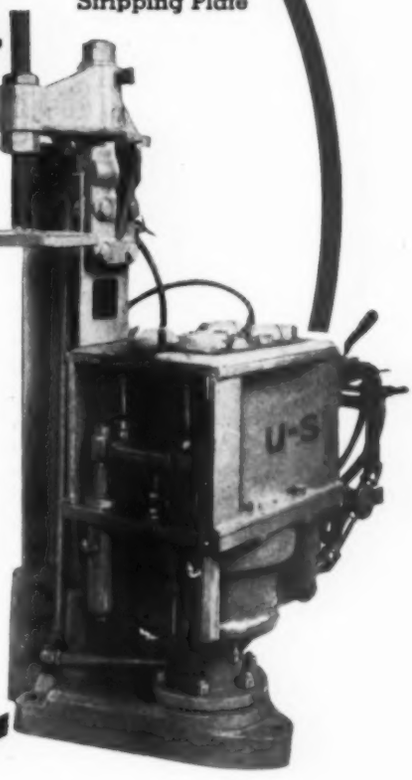

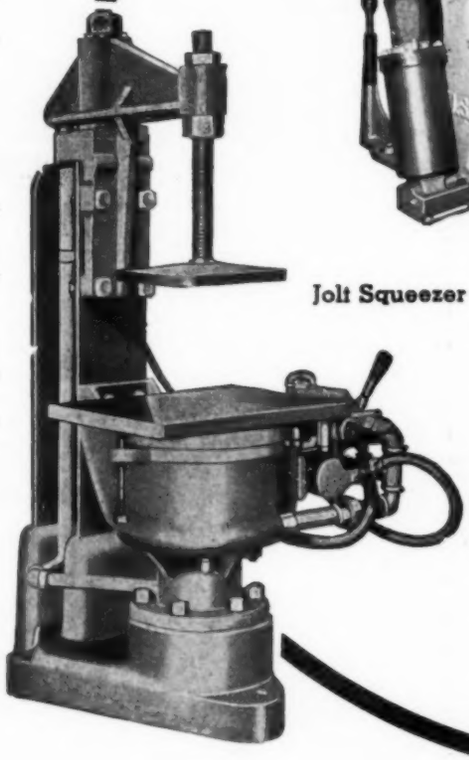

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New Jersey Group Holds Meeting

Arthur M. Torrey, secretary of the Employers' Association of New Jersey, discussed various important aspects of "Sound Labor Relations Policies" at a meeting of the New Jersey Foundrymen's association, held March 23 at the Downtown club, Newark, N. J.

John L. Carter, executive secretary of the association, reported on the results of a recent survey of wages and hours. The survey included figures from 34 different foundries.

Purchasing Agents To Meet

The twenty-second annual international convention of the National Association of Purchasing Agents will be held in the William Penn hotel, Pittsburgh, from May 24 through May 27. Between 1200 and 1400 members are expected to attend the convention, representing many industries of the country. Groups of delegates are to be conducted on tours through a number of Pittsburgh's mills and plants. Thomas D. Jolly, general purchasing agent, Aluminum Co. of America, is chairman of the program committee and also president of the Pittsburgh unit of the N.A.P.A.

Talks On Materials At Rock Island

"Materials Used for Molds and Cores" was the subject discussed by H. L. Campbell, metallurgical engineer, American Hoist & Derrick Co., St. Paul, at the March 15 meeting of the Quad-City Chapter of the American Foundrymen's association, held at the Fort Armstrong hotel, Rock Island, Ill.

Mr. Campbell stressed the importance of making an analysis of problems in the foundry. A complete investigation following the analysis, he stated, will lead to an easier solution of these problems, many of which may be due to materials and their uses. The speaker made three divisions of the materials used for molds, as follows: Refractories, such as sand, silica flour, plumbago and seacoal; bonding materials, such as fire clay, bentonite, etc.; and solvents, as water and naphtha. These were discussed in detail, including the effect produced by each when used on cores and molds. Mr. Campbell's talk was illustrated by slides and graphs.

T. J. Frank, chairman of the chapter, appointed a nominating committee consisting of Clyde H. Burgston, chairman, J. H. Ploehn and A. E. Hageboeck. An auditing committee also was appointed, consisting of J. Morgan Johnson, E. A. Gullberg and C. F. Scherer.

Probes Engineering And the Foundry

George Zabel, superintendent of foundries for the Fairbanks, Morse & Co., Beloit, Wis., was the main speaker at a meeting of the Detroit Chapter of the American Foundrymen's association, held at the Fort Shelby hotel March 18. His subject was "Engineering and Its Relation to the Foundry." The speaker stressed the point that engineering designers should co-operate with the foundry to facilitate the production of castings. Leslie G. Korte, chairman of the chapter, presided at the meeting.

Exhibit Scrap, Molds At St. Louis

The St. Louis District Chapter of the American Foundrymen's association held an interesting meeting on March 11. Harold Dean, manager of the foundry division, Tamms Silica Co., presented a short talk on a pattern compound produced by the Tamms company. As a practical demonstration, he used molds which had been prepared prior to the meeting. Mr. Dean stated that the pattern compound was adaptable and readily produced toughness in a finished plate. For illustration a pattern was poured, the speaker giving an explanation of the procedure.

S. M. Tiffin, assistant general manager of the St. Louis office, Federated Metals division, American Smelting & Refining Co., used a large prepared exhibit of nonferrous metal scrap as the basis of his talk. He gave a comprehensive description of various contaminating influences and elements in that type of scrap. Mr. Tiffin emphasized that only experienced metal sorters, backed by laboratory analysis, could determine definitely what scrap is suited best for various types of castings. Francis O'Hare, Central Brass & Aluminum Foundry, presided during that part of the program.

Several articles of interest to foundrymen are contained in the November, 1936, issue of *Sands, Clays and Minerals*, Chatteris, England. One is entitled, "Present Position of Molding Sand Tests in England," by N. D. Ridsdale, and another, "Boron, the Metal and Its Uses," by L. Sanderson.

Society Issues Gray Iron Booklet

Gray Iron Founders' society, 1010 Public Square building, Cleveland, has prepared an interesting booklet entitled "O.K. After Machining" which emphasizes the common interest shared by the manufacturer, designer, metallurgist and foundryman. Developments in the gray iron foundry industry are sketched briefly to point out the advantages of gray iron and the ingenuity of foundrymen. The booklet concludes with the statement that gray iron should be investigated thoroughly by all concerned, to determine its value.

Book Review

Mechanical Testing of Metals and Alloys, by P. Field Foster, 394 pages, cloth bound, published by the Pitman Publishing Corp., New York and supplied by THE FOUNDRY, Cleveland, for $3.75 plus 15 cents postage and in Europe by the Penton Publishing Co. Ltd., London.

This volume is the outcome of a series of articles on testing machines and their applications which Mr. Foster contributed to *Machinery* during the years 1931-1932. It couples descriptions of modern testing equipment with its mode of use and at the same time embraces in a practical way the theory underlying present-day developments in the testing of metals and their alloys. Consequently the original articles form but a small part of the book.

An attempt has been made to keep within the range of tests already standardized by the British Standards institution. Indexed references are placed at the end of the book, each with the number of the page to which it refers. The volume covers such subjects as elasticity, structure of metals, testing machines, tension and bending tests, notched-bar impact testing and repeated stresses of material.

Acquires Division

Tramrail division of the Osborn Mfg. Co., 5401 Hamilton avenue, Cleveland, recently was acquired by the Cleveland Crane & Engineering Co., Cleveland Tramrail division, Wickliffe, O.

Opens Agency

Tabor Mfg. Co., 6225 Tacony street, Philadelphia, recently has established a southern agency at Chattanooga, Tenn., in charge of H. H. Reich, 258 Glenwood drive.

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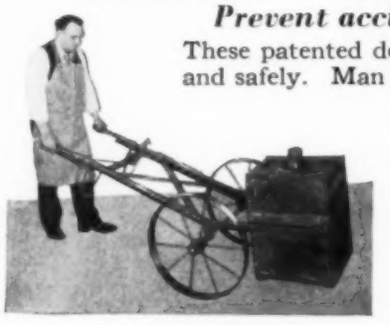

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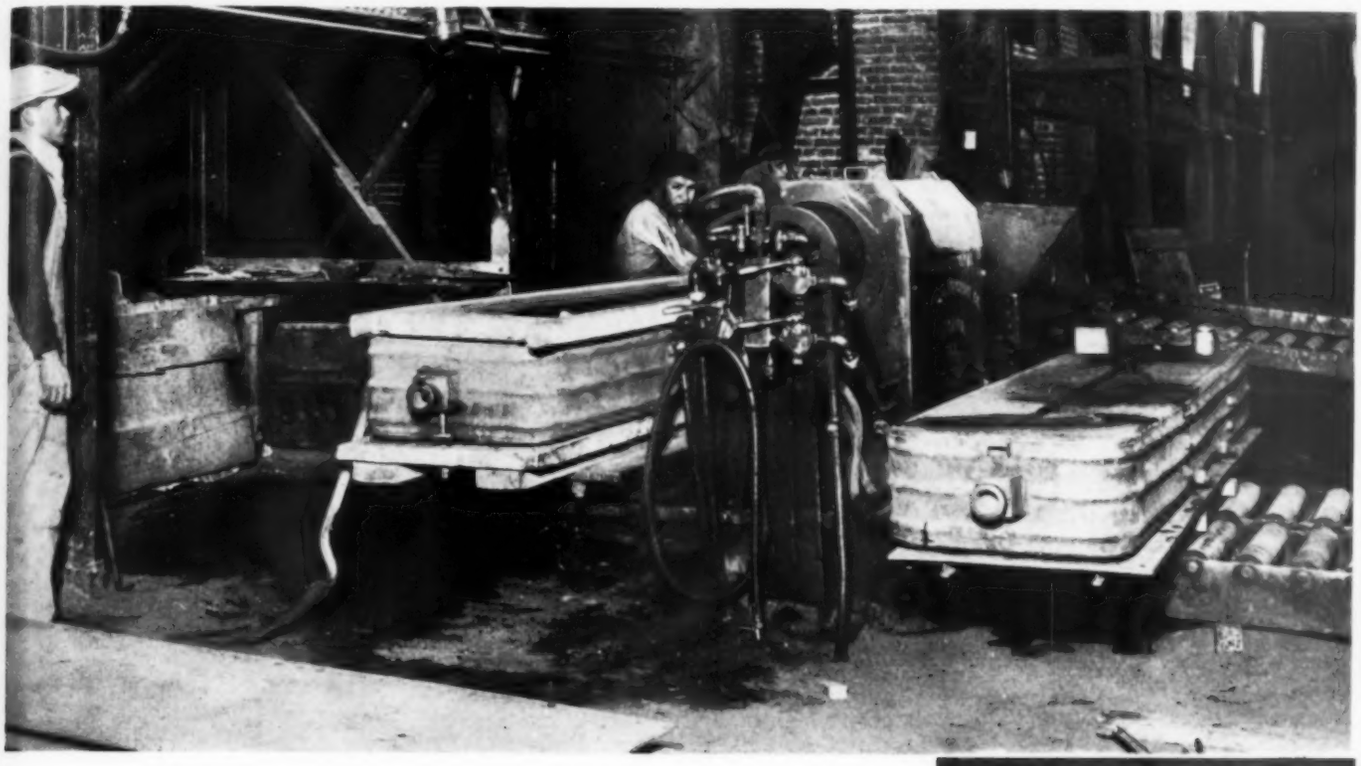

Machines shown on this page

Type F Jolt - Power Turnover - Power Draw

Type LJSD Double Head Jolt Squeezer

Type SBII Core Blower

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(*Concluded from page* 38)

liams & Co., as vice chairman, has arranged with the following clubs to extend playing privileges to those attending the convention: Blue Mound Country club, Ozaukee Country club, Westmoor Country club, North Hills Country club, Tuckaway Country club, Tripoli Country cub, and Merril Hills Country club. Information on various details, location of the courses, transportation, etc. may be obtained at the registration desk in the Auditorium.

The annual dinner of the American Foundrymen's association will be held Thursday evening, May 6 at 7 p. m. in the Crystal ballroom, Hotel Schroeder. The committee, with Lamar S. Peregoy, Sivyer Steel Castings Co. as chairman, and H. J. Held, Rundle Mfg. Co. as vice chairman, has secured the Lyric male chorus, a nationally known organization, as a feature of the entertainment program. As in the past, the gold medal awards of the association will be presented during the program. A reception and dance will follow the formal program.

The complete technical features of the convention program are presented on page 46 and 47 of this issue of THE FOUNDRY. Technical Secretary Robert E. Kennedy, with the assistance of the papers committee, has prepared a well-balanced program of papers, committee reports and informal discussions which offers an exceedingly instructive and valuable cross-section of the progress which has been made in all branches of the foundry industry. Highlights of the program include practical shop operation courses on sand and gray cast iron; sessions on management, including problems of job evaluation, apprentice training, foundry costs, safety methods and good housekeeping, occupational disease laws, and foreman training; round table discussions; technical sessions covering cast iron, steel, malleable and nonferrous practice, sand research and foundry refractories. The session on safety methods and good housekeeping will be held Wednesday evening starting at 7:30, under the chairmanship of Voyta Wrabetz, Industrial Commission of Wisconsin, Madison, Wis.

Officers will be elected at the annual meeting, Thursday afternoon at 4 p. m., with President Wick presiding. The following have been nominated for officers and directors of the association for 1938:

President: Hyman Bornstein, chief chemist and metallurgist, Deere & Co., Moline, Ill.

Vice president: Marshall Post, vice president and works manager, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

Directors to serve terms of three years each: Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill.; H. B. Hanley, foundry superintendent, American Laundry Machinery Co., Rochester, N. Y.; C. J. P. Hoehn, president, Enterprise Foundry Co., San Francisco; Thomas Kaveny, president, Herman Pneumatic Machine Co., Pittsburgh; and James L. Wick Jr., president, Falcon Bronze Co., Youngstown, O. For director to replace Mr. Post and serve for two years: C. E. Sims, supervising metallurgist, Battelle Memorial institute, Columbus, O.

The nominating committee was composed of the following: T. S. Hammond, Whiting Corp., Harvey, Ill., chairman; Frank J. Lanahan, Fort Pitt Malleable Iron Co., Pittsburgh; E. H. Ballard, General Electric Co., West Lynn, Mass.; John H. Locke, General Steel Castings Corp., Eddystone, Pa.; Garnet P. Phillips, International Harvester Co., Chicago; Harold J. Roast, Canadian Bronze Co. Ltd., Montreal; and Richard Schneidewind, University of Michigan, Ann Arbor, Mich.

Book Review

A. S. T. M. Standards, 1936, *Part II*, relating to nonmetallic materials, 1477 pages, published by the American Society for Testing Materials, Philadelphia, and supplied by THE FOUNDRY, Cleveland, for $7.50 in cloth binding, plus 15 cents postage, and in Europe by the Penton Publishing Co. Ltd., London.

This triennial book covers all of the standard specifications, methods of test, recommended practices and definitions for nonmetallic materials formally adopted by the society. The volume contains 335 standards, of which 91 cover cement, lime, gypsum, concrete and clay products, 239 relate to miscellaneous materials, such as coal, timber, paint, petroleum, etc., and 5 apply in general to these materials.

Specifications for a particular class of material are given first, followed directly by the test methods, definitions, etc. A complete subject index lists each standard under the principal subject covered with the key words in alphabetical sequence. Two tables of contents, one listing standards by the materials and the other in the order of sequence of serial designations, also facilitate the use of this comprehensive volume.

Reports On Gas and Electricity

The bureau of foreign and domestic commerce, Washington, recently has published an interesting factual analysis of the gas and electric utilities in the United States, prepared by O. C. Holleran, marketing research division. The new report is another of the bureau's "Basic Industrial Markets" series. It contains 157 pages of text and tables with 9 large maps.

The study gives statistical data, on a county basis, for each of the major groups in the electrical power industry, both by type of production and by type of ownership. Location and capacity is illustrated by maps which allow a quick estimate of the market value of either of the two industries of any section of the country. Copies are available from the bureau for 10 cents.

Plan Summer School At M.I.T.

A special summer school and conferences on "Strength of Materials" will be held at Massachusetts Institute of Technology, Cambridge, Mass., for four weeks beginning June 21. Dr. A. Nadai, consulting engineer, Westinghouse Electric & Mfg. Co., Pittsburgh, will present material on creep. The last two lectures of this series will be given by C. R. Soderberg, manager, steam turbine department, Westinghouse Electric & Mfg. Co., in which design applications using the plasticity theory will be discussed.

Lectures on fatigue will be given by Dr. H. J. Gough, superintendent, engineering department, National Physical Laboratory, England. Lectures on "Strength of Materials" will be presented by members of the institute staff. Those intending to register should do so by June 1. Further information may be received from Prof. John M. Lessells, department of mechanical engineering, M.I.T.

Publishes Index

The American Society for Testing Materials recently has published an index of standards and tentative standards. The 120-page publication gives information on the 796 standards as of Jan. 1, 1937. Copies of this publication may be secured from A. S. T. M. headquarters, 260 South Broad street, Philadelphia.

Medart Co., St. Louis, has opened a district sales office at Room 1559 Dierks building, Kansas City, Mo., in charge of W. A. Crooks.

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Changes In Enameling

(*Concluded from page* 53)

in cast iron by the enameling process. The degree of change is dependent upon (1) the temperature attained by the casting during enameling, and (2) the time during which the temperature is maintained. A temperature of 800 degrees Fahr. probably will produce only a very limited transformation, while a temperature of 1300 degrees Fahr. may alter the pearlitic structure entirely, given sufficient time. Certain analyses tend to accelerate or retard the transformation of pearlite, but in general, after enameling, nearly all castings will show a ferrite-graphite structure, with pearlitic combined carbon reduced to a minimum.

The precise effect of the enameling process upon any particular castings can be determined for any given physical properties.

Six 1 x 13-inch bars of the thickness of the average casting might be made, taking care that the dimensions as to thickness and width are exactly the same for each bar.

One of the bars should accompany each of three heats in the enameling furnace, and be treated thermally exactly like the castings being enameled, without actually enameling the bars. After preparing three bars in this manner all six bars should be broken between 12-inch centers on a standard transverse breaking machine, noting the deflection under various loads and at breaking. The readings for each group of bars are averaged. As for example, in the accompanying table using purely hypothetical figures.

This test should establish any weakening effect of the enameling process.

A drill press should be arranged so that the feed carries a definite, constant load. A jig sharpened or brand new ¼-inch drill is placed in the chuck. A vise is securely mounted on the bed of the drill press. The 12 pieces produced by breaking the bars are drilled one after the other, being careful to alternate heated and unheated pieces, and to see that all pieces are mounted in exactly the same manner in the vise.

A stop watch is started when the point of the drill first comes in contact with the top surface of the piece, and stopped when the first evidence of penetration through the bottom surface is discerned. A separate average of the times required for drilling the six heated and the six unheated pieces is made.

The average drilling time for the six heated pieces probably will be less than that for the unheated pieces, showing an improvement in machinability on annealing. Whatever may be the direction of the result, the relative machinability will be indicated.

For chemical analysis, drillings are taken separately from each set of bars, being careful to run the drill all the way through each time a hole is made. All of the drillings from each hole are collected carefully. Unheated pieces are completely analyzed. Heated pieces are run only for graphite, combined carbon and total carbon.

For microscopic examination, one heated, and one unheated piece should be sent to a competent metallographist, with instructions to take pictures of the polished cross sections, etched in nital, at 100 diameters, and report the changes found in general structural characteristics. The photomicrographs will reveal the alteration of structure produced by enameling.

For enameling purposes, the production of castings of high tensile strength is probably of little advantage, or none, since the structure responsible for the high strength is largely destroyed during the enameling process. For example, ¼-⅜-inch castings of the following analysis may be very strong, though probably easy to machine, before enameling:

1.	Silicon	2.25
	Manganese	0.75 -0.85
	Phosphorus	0.18 -0.24
	Sulphur	0.065-0.075
	Nickel	0.40 -0.50
	Total Carbon	3.24

Initially weaker castings probably will result if the analysis is altered by eliminating nickel and steel scrap, and raising phosphorus, (replacing the nickel by 1/3 its amount of silicon) as follows:

2.	Silicon	2.40
	Manganese	0.75 -0.85
	Phosphorus	0.70 -0.75
	Sulphur	0.065-0.075
	Total Carbon	3.40 -3.50

After enameling, these two types of iron probably will show fairly similar structure and strength.

There is likely to be a considerable difference in the behavior of these irons on casting, and in the strains produced in the casting due to shrinkage stresses set up on cooling. Iron of composition 1 is somewhat hypo-eutectic and will begin to solidify at a high temperature. Due to absence of a notable amount of phosphorus, total solidification will take place at a relatively high temperature. Such characteristics make for high shrinkage and great internal stresses in uneven sections.

Iron of type 2 will have a high degree of fluidity and will begin to solidify at approximately the temperature when iron 1 is completely frozen. Iron 2 probably will be more fluid during solidification than 1. Total shrinkage of iron 2 may be much less than iron 1.

Where, in designing certain castings, it seems necessary to place light and heavy sections in juxtaposition, high tensile iron or semi-steel will readily accumulate sufficient stress to result in a crack on prolonged reheating or annealing. If the casting is to be enameled, an iron of composition 2 is easy to cast, and will be almost equally strong as iron 1 after enameling.

Enamel usually adheres better to a slightly roughened surface, such as that produced by blasting, than it does to a smooth surface such as is produced by buffing.

Although the practice is to be frowned upon, castings very often, both here and abroad, are allowed to cool on concrete floors. Better practice indicates the use of insulated cooling chambers.

Book Review

Commercial Iron, by Paul Oberhoffer, revised and enlarged by W. Eilender and H. Esser, cloth, 642 pages, 6½ x 9⅝ inches, published by Julius Springer, Berlin, Germany, and supplied by THE FOUNDRY, Cleveland, and in London by the Penton Publishing Co. Ltd., Caxton House, Westminster.

This volume, which is in German, is the third edition of Oberhoffer's work, which although revised and enlarged in scope is little increased in size. The new material contained in the present volume includes that on two and three phase alloys, flaking in steel, and precipitation hardening and nitriding. In addition, sections on gases in steel, deoxidation, influence of temperature on properties, red shortness, cold working and recrystallization, and steel hardening, are basically reworked.

The book is divided into seven main chapters of which the first is entitled "The Definition and Classification of Commercial Iron." The second, "The Constitution of Iron in Relation to the Chemical Composition" discusses various iron systems such as iron-carbon, iron-silicon, etc., gases and slag inclusions in steel, quaternary and complex steels, and the specific influence of the most important elements on the properties of steel. Chapter III is devoted to the influence of temperature on the properties of steel while Chapter IV discusses the influence of working on the structure and properties of steel. Malleable cast iron is the topic of Chapter V while Chapter VI is devoted to gray cast iron. Chapter VII on hard or chilled iron concludes the book. The book also contains a bibliography of literature, name index and subject index.

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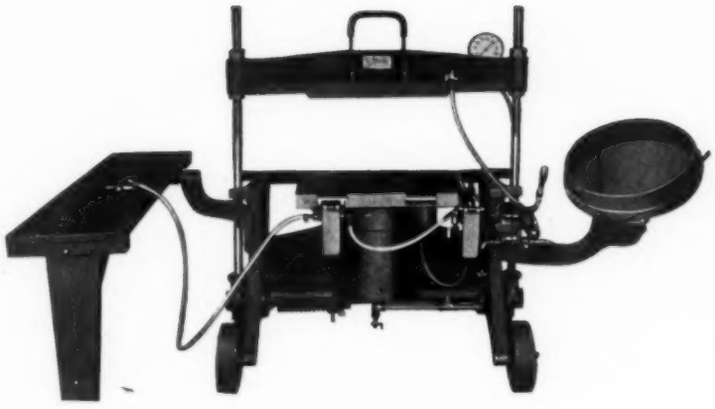

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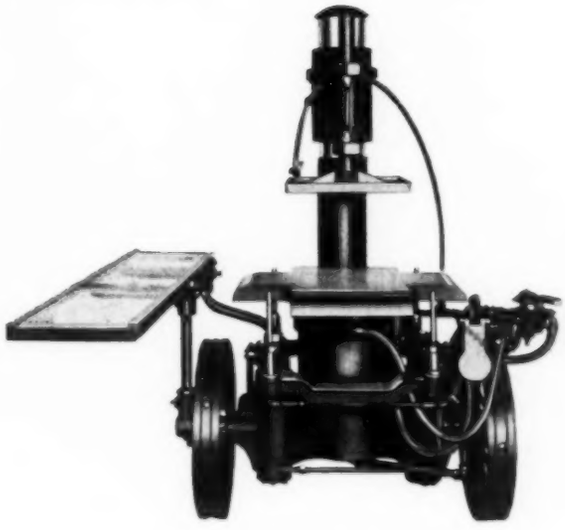

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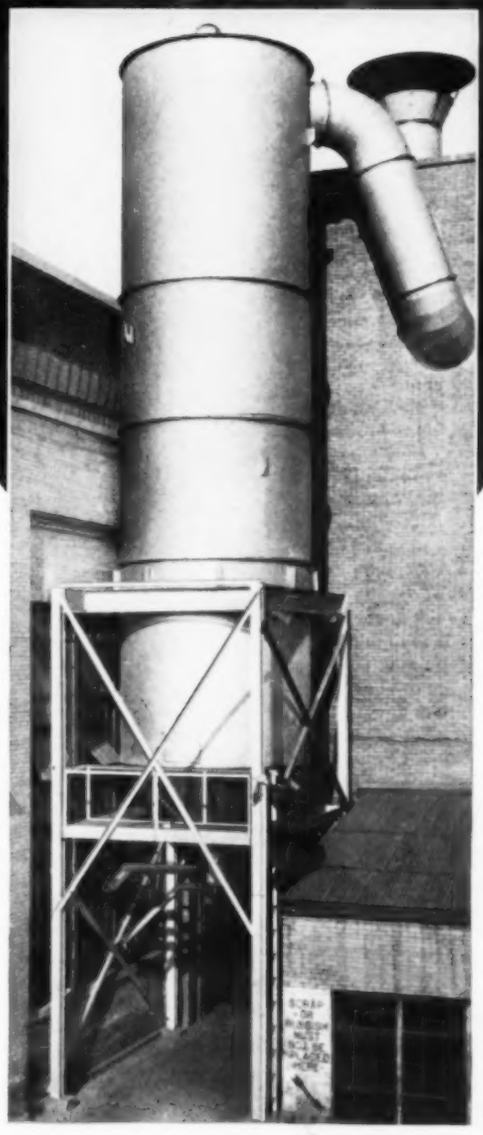

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Fig. 8—Heat from the firing chamber at one end enters the oven through openings in the floor

Features Machine Tools

(*Continued from page* 57)

the outside and protected by a thick glass window, manipulates either nozzle through a comparatively wide circle. Incidentally under the incentive of a wage based on results it is claimed that the operator in this particular instance has developed into a highly skilled specialist.

Another of the advantages claimed for this method is that the reinforcing rods are not hammered and bent out of shape, but are reclaimed in fit condition to be used again immediately if necessary. They are loaded into a pan attached to the crane chains, hoisted out and deposited either in general storage, or in the vicinity of the coremaking stations located in the nearby second side bay.

Practically all the sand washed from the castings is reclaimed and returned for use either in the core room or on the dry sand molding section of the foundry. A small amount of pitch binder is added to the dry sand facing, while pitch binder and a small amount of Milville gravel are added to the sand going into the coreboxes. This applies of course only to large, bulky cores and a general line of other miscellaneous cores. Remainder of the cores, small cores, special cores, etc., are made of sharp sand bonded with oil. Black sand core and facing mixtures are prepared in the basement in a muller type mixer made by the National Engineering Co., Chicago. The oil sand mixtures are prepared in a paddle type mixer. A sand slinger made by the Beardsley & Piper Co., Chicago is mounted in the center bay of the foundry close to the side bay where the cores are made. It is employed as occasion may demand in ramming sand either in flasks for molds, or in coreboxes.

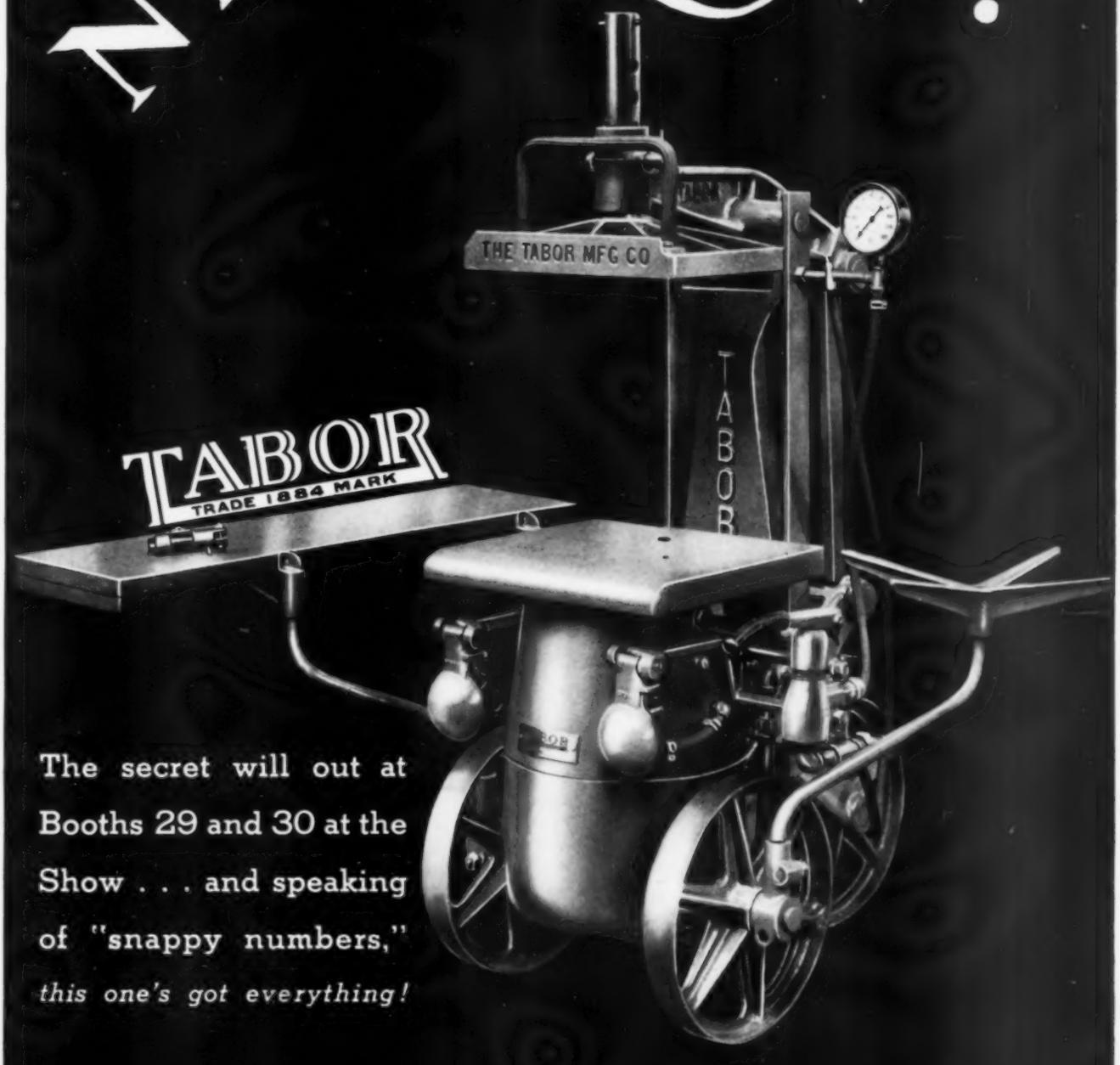
Sand and water from the washer flow along an inclined flat chute where the sand is deposited in regular progression of grain size, coarse sand first, then increasingly finer grains, until finally practically all the silt or fines is deposited in one locality from which later it is removed and discarded. The remainder of the sand is returned to the storage pile near the mixer. At first the exceedingly fine silt was not deposited, but was carried in the water to the point of discharge in a neighboring creek. Objection to this form of pollution resulted in the adoption of a simple device which not only removed all the silt, but also catches all the pitch washed from the core sand grains. A barrier of coke 3 or 4 feet wide near the end of the chute filters the contaminated water and removes all the impurities. So effective is this strainer that the water no longer is discharged into the creek, but is discharged into a well or sump, from which it is drawn continuously for further use. The coke barrier is changed about once a month. The contaminated coke is burned under one of the boilers, where it is claimed the pitch impregnated material has a considerably higher thermal value than coke in the original state.

In addition to making dry sand molds in the ordinary manner, two other methods are practiced extensively as shown in Figs. 2 and 3. In the first method shown in Fig. 2 the pattern is mounted in the bottom of a corebox. Where the pattern is symmetrical in relation to a horizontal parting line, one box is used for making the two half cores. Otherwise two coreboxes are employed. Manifestly if necessary three, or for that matter any number of sections could be made in the same manner. Usually two coreboxes are employed. To insure accuracy in placing the cope or upper part on the drag or lower part during the assembling operation, the guiding device shown on the left corners of the box is em-

(*Concluded on page* 157)

Fig. 9—Water at high pressure is directed on the castings through two swivel nozzles in the back wall

NEW! new!



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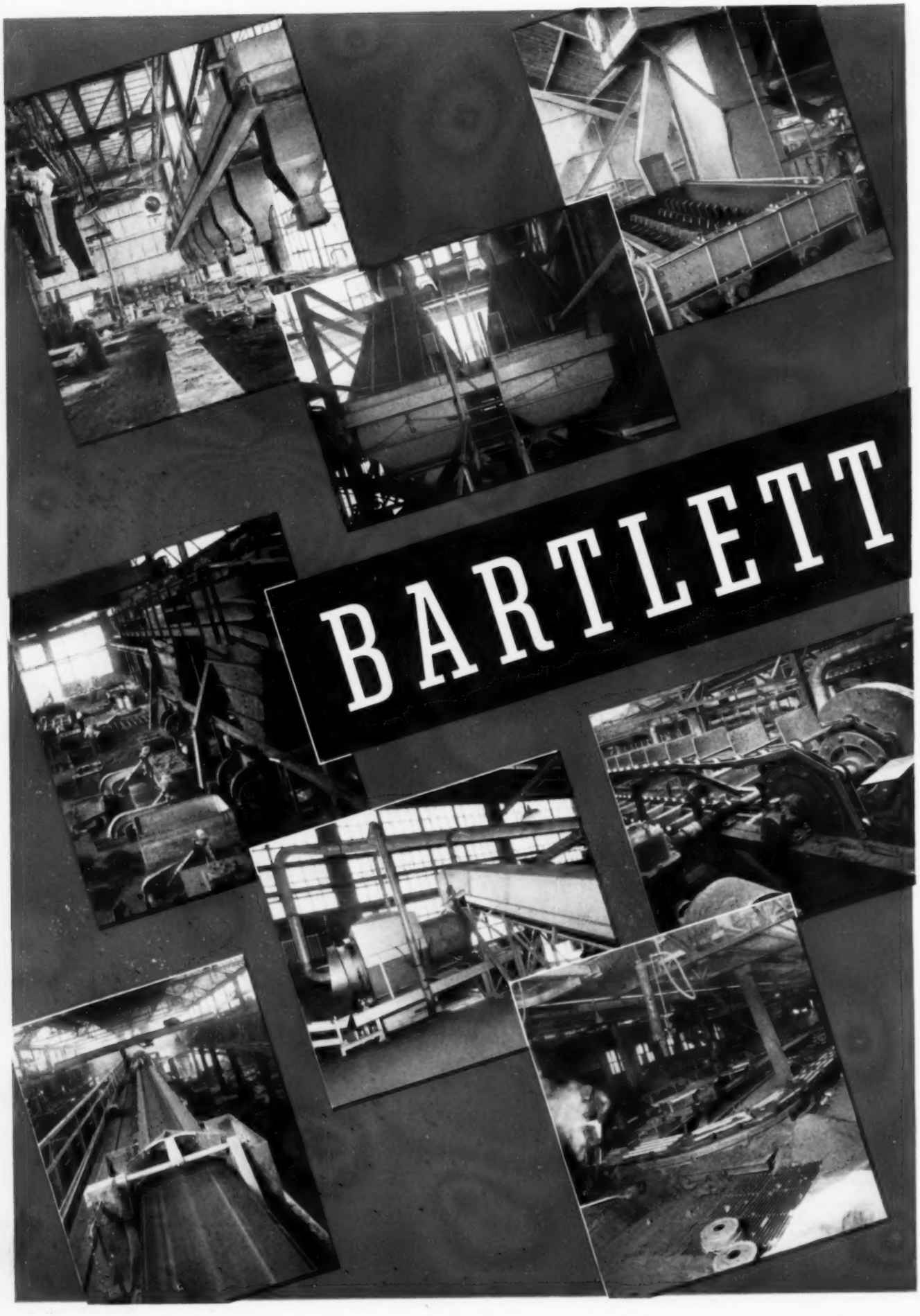
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(*Concluded from page* 152)

ployed. The round stick leaves a hole through the green core and by placing a corresponding stick in the hole in the drag half of the dried core, and by allowing this stick to project through the hole in the upper or cope core, the two parts are brought into proper alignment. The cores are rodded in the ordinary manner, but no bands, jackets or other form of reinforcement is employed where the cores are set up on the pouring floor. Method for gating one of the castings made in this manner, also is shown in the same illustration.

Typical molds, a set of cores and one of the castings made by the second method are shown in Fig. 3. Accuracy of dimension in the various lugs, bosses and brackets not only in themselves but in relation to each other is the paramount factor in this casting. Possibility of slight error one of the hazards of a sand mold, is eliminated in this instance by providing a cast iron mold accurately machined on the inside. The various core sand parts designed to form the mold are assembled as a unit and lowered into the cast iron frame. The walls of the frame or container are tapered to facilitate placing the cores.

The method is applicable to many types of castings and provides positive insurance that the molds will not strain, swell or sag out of shape. The form of construction is optional. Some of these containers, as shown, are made up of several parts bolted together. In other instances, for example a circular shape, the container is cast as a single piece for convenience in machining. Incidentally it has been found by experience that it is easier to first machine the container and then taper the corebox to fit then it is to first build the corebox and then attempt to machine the casting to the same taper. Theoretically, of course, no difference should exist, but apparently this is just another one of those little shop things where theory and practice fail to coincide perfectly.

Greater part of the third bay is occupied by the melting department and the coremaking department. The remainder of the space at one end of the bay is devoted to snap flask and bench molding. Space at the other end of the bay is utilized by the shipping department in despatching castings cleaned on the adjoining space in the center bay.

Raw materials, pig iron, scrap coke and limestone are stored in the yard outside this side of the building and therefore in proximity to the cupola charging floor. This floor projects beyond the wall and serves as a landing platform for all the material lifted by a traveling crane. The charges are made up in small buggies and pushed by hand from the outside platform to the inside floor in the vicinity of the cupola charging doors. The material is thrown into the cupola by hand. One cupola is lined to 42 inches inside diameter while the other is lined to 60 inches.

Steel enters extensively into the cupola charges, ranging from 25 per cent in common or general purpose iron, to 75 per cent in metal designed for castings subjected to unusually severe service.

Mixtures for special purpose cover a wide range and in many instances contain appreciable amounts of foreign pig iron from India and from Holland. Gratifying results in many respects are claimed to follow the use of a special brand of pig iron made by the Bethlehem Steel Co., Bethlehem, Pa. The cupola charge for the 42-inch diameter cupola is made up of 1250 pounds iron and 160 pounds coke. A typical charge for high duty iron contains 750 pounds steel scrap, 250 pounds automobile scrap and 250 pounds high silicon pig iron.

Blast for the cupola is supplied by a centrifugal type blower made by the Ingersoll-Rand Co. it is claimed that this type of blower provides an accurate check on melting conditions in the cupola through automatic compensation for any change in temperature, humidity and pressure in the atmosphere. A definite weight of air containing the correct amount of oxygen for complete combustion of the given amount of coke, and irrespective of atmospheric changes, is supplied throughout the duration of the heat.

Book Review

Printing Metals, 92 pages, cloth bound, published by Fry's Metal Foundries Ltd., Tandem Works, London S. W. 19—and supplied through THE FOUNDRY, Cleveland and in Europe by the Penton Publishing Co. Ltd., London.

This booklet offers an outline of the metallurgy of printing metals and of the factors governing the choice of alloys for particular purposes. It considers the general principles of metal casting and the problems of casting type and stereo plates. Finally, it offers advice on the care of printing metals during use. An interesting historical reference to original type casting and metals serves as an introduction to the book.

Subsequently the following subjects are treated: Physical requirements and properties of printing metals; constitution and physical structure; micrographs; electro backing metals; quality and effect of impurities; electrical heating; and the future of printing metals. Many other topics of equal importance are given consideration. The book, while a treatise on scientific principles, is written in an easy manner, and through clear diagrams presents what would otherwise be complicated subjects in an understandable light.

New England Group Studies Melting

A description of various types of cupolas and a brief outline of modern practice in melting iron in the cupola were features of the March 10 meeting of the New England Foundrymen's association, held at the Engineers club, Boston. W. R. Bean, vice president in charge of the foundry equipment division, Whiting Corp., Harvey, Ill., delivered the principal talk of the evening.

In discussing melting practice, Mr. Bean stated that front slagging had resulted in a cleaner metal. Continuous pouring, he said, has enabled foundries to obtain lower sulphur and in some cases slightly lower carbon. The speaker discussed the hot blast, for which he gave figures showing a saving of approximately 20 per cent in the amount of coke burned per hour, as well as lower oxidation and in most every case a cleaner drop of the bottom. He emphasized mechanical charging as an important factor in modern cupola operation.

Mr. Bean described the air furnace with particular regard to duplexing and in this connection mentioned the latest type of cradle furnace. In response to a question about low volatile coal in the air furnace, he stated that it is being used in some cases, its advantages being better grindability and shorter flame. The speaker commented on the Brackelsburg furnace. Slides of various melting furnaces were shown as well as modern layouts for mechanical charging and continuous operated foundries melting large tonnages per day.

Sale of Bentonite For Foundries

It is claimed that patents covering the use of bentonite clay as it is being generally used in foundries for bonding molding and core sands, have been in existence for several years.

These patents recently were acquired by a Maryland corporation. After a complete investigation of the patent claims and their application to the use of bentonite in foundry sand bonding, several of the largest producers of bentonite negotiated agreements for the license of its use in foundry practice, thus, it is believed, relieving their customers of any liability for infringement.

Nicholls type D machines are built in 10 sizes to take care of various size flasks.

In Production

The NICHOLLS 14-36 Type D heavy duty combination jolt and power squeezer molding machine with pattern drawing device shown here—in raised position to show working parts—is widely used in the production of transmission cases, manifolds, fly wheels, brake drums, and smaller size work. The base, cylinder, bushing supports, valve bracket and supports for both uprights, are all cast in one piece, thus attaining the utmost in rigidity and permanent alignment. All pins and bushings are hardened and ground, fitted to within .002″ tolerances, the pins working in oil by means of dash pots. Cylinders and pistons are ground, insuring closer tolerances, also increasing the life of the machines. The forced lubrication system oils the jolt and squeeze pistons above as well as below the rings.

Leadership in the production foundries means dominance in America's No. 1 molding machine market. It means fast, continuous production must be assured at all times—closely linked production schedules permit no time out for maintenance. It means acceptance where requirements are strictest and schedules most rigorous.

Nicholls, by first establishing its record in the field where the going is toughest, certainly seals its bid for important consideration throughout the foundry industry.

With a name as old as machine molding, and a reputation as good as the industry is basic, Nicholls is prepared to furnish machines and service that give you the unfailing best that it is possible to buy.

Visit Our Booth at the American Foundrymen's Convention Milwaukee, Wisc.

NICHOLLS MOLDING MACHINES have sold themselves on their own merits and our reward for complete satisfaction has been the many repeat orders we receive. Foundrymen, we are proud of this Record!!

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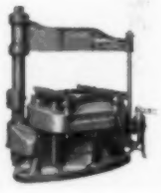
Representing the utmost in mechanical achievement that at the same time conforms to accepted foundry practice, molding machines by Nicholls carry the additional promise of satisfaction reflected from a decade of constant improvement under actual foundry operating conditions.

★ ★ ★ THE NICHOLLS LINE IS COMPLETE



From the comparatively diminutive squeezers to the giant roll-overs—the Nicholls line is complete. Starting slowly in the early days of machine molding, Nicholls met the industry's needs as they developed. In order to match the stride of foundry progress, simple engineering principles were settled upon and adhered to. Discovering early that speed was expensively gained if schedules were interrupted for repairs, Nicholls has constantly sought reduction of moving parts, greater strength and weight where it would count the most, and more scientific methods of lubrication.

Molding machines that meet today's demand for greater production, more uniform castings, lower percentage of loss, and lower maintenance are the direct results of continued efforts toward improvement. Call on Nicholls for recommendations. Let us have sketches of your patterns, castings required per day, and flask sizes—or, if you prefer, we will have a representative call.

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NICHOLLS

Why Is A Laboratory

(*Concluded from page* 59)

runs. Even if there exists a set of analyses showing the composition (so far as known) the difference in composition may or may not have meaning in explaining the losses.

In our imaginary problem we may compute the average value of the silicon content and per cent rejection for the good and bad groups and their standard deviations. We may then compute the standard deviation of each average by dividing the standard deviation for each group by the square root of the number of observations in the group. The standard deviation of the differences between two average values (say of silicon) will be the square root of the sum of the squares of the standard deviations of the two averages. Unless the observed difference in averages is fairly large compared with the standard deviation of the difference, the chance is good (about 2 to 1 when equal to the standard deviation) that it is due to random chance and not to the other variable in the problem.

If both silicon and loss prove to be significantly different in the two groups one may throw the two groups into one and compute the coefficient of correlation of silicon and loss. This is done by computing first the average value ($\bar{x}$) of all the silicon determinations and their standard deviation (σ_x), as also the average ($\bar{y}$) and standard deviation (σ_y) of all the losses. Compute also the average value $\left(\frac{\Sigma xy}{n}\right)$ of all the products of the silicon content and per cent of loss which go together. Then the coefficient of correlation of x and y (r_{xy}) is

$$r_{xy} = \frac{\frac{\Sigma_{xy}}{n} - \bar{x}\bar{y}}{\sigma_x \sigma_y}$$

This may look a little formidable but should not scare anybody who can add, subtract, multiply, divide and extract the square root. If r is zero, the two variables are not correlated; if 1, the correlation is perfect, i.e. there is only one possible value of loss for each value of silicon. The two variables can not be considered cause and effect unless r_{xy} approaches one.

Carry this problem backward a step or two, it is plain that the sampling for silicon must have been so carried out that the standard deviation of silicon values on a multiplicity of samples taken from what is supposed to be a uniform lot of material is small compared with the final standard deviation and further that the deviations arising out of analytical procedure vanish in comparison with either.

The mere collection of laboratory data even and perhaps especially when carried out by uneducated as distinguished from unskilled help may not be a particularly good investment. Every organization using a laboratory to real purpose should, indeed must, have available someone capable of determining what the laboratory's results really mean in terms of operating control. Someone must be able to plan how to get data under circumstances so that conclusions drawn from them will be reliable for the intended purpose. That individual be he called chemist, metallurgist, superintendent or manager, is the one who alone can justify the existence of the laboratory.

A.F.A. Officers Visit Ohio Chapter

Over 125 members and guests of the Northeastern Ohio Chapter of the A. F. A. attended its National Officers' night held at the Cleveland club, Cleveland, March 11. Guests of honor were A. F. A. President, James L. Wick Jr., Falcon Bronze Co., Youngstown, O.; A. F. A. Vice President, Hyman Bornstein, John Deere & Co., Moline, Ill., and A. F. A. Secretary-treasurer Dan M. Avey, Chicago. Frank G. Steinebach, THE FOUNDRY, Cleveland, presided and introduced the speakers.

President Wick pointed out the advantages of membership in the A. F. A., citing his own case as a specific example. He said that the interchange of information on all phases of the foundry industry, fostered by the association, enabled him to operate a progressive foundry on a profitable business basis. Dan M. Avey, secretary-treasurer, outlined the aims of the new enlarged program of the A. F. A. which included broadening and co-ordination of the various activities, extension of membership and chapters, establishment of codes and ethics for the foundry industry, etc.

Hyman Bornstein presented the main address of the meeting, and spoke on gray cast iron with particular reference to practices employed in the Waterloo, Iowa, tractor division of John Deere & Co. He said that selection of raw materials for the cupola depended on the market price and geographical location. Essentially, the iron charges are composed of pig iron, silvery pig, auto cylinder scrap, No. 1 scrap, steel scrap, briquetted iron borings and briquetted steel turnings. The latter two comprise 17.5 per cent of the charge.

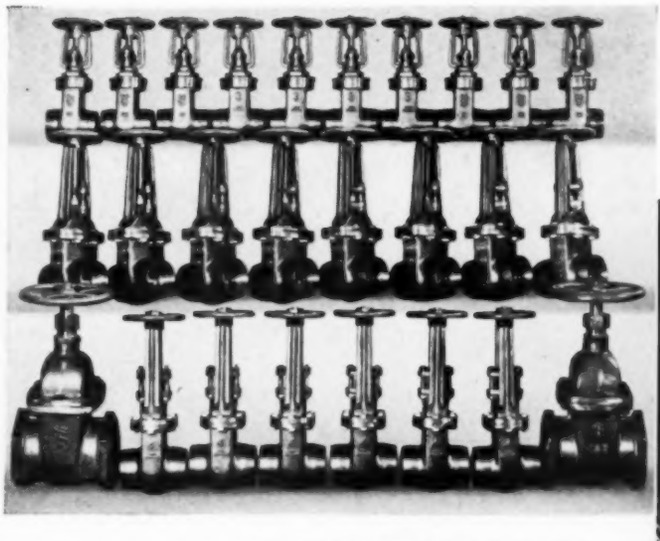
Total cost of cast iron briquetting is $1.01 per ton while that on steel turnings is $1.52 per ton, according to Mr. Bornstein. Four cupolas are used alternately, and of the two in operation on one day, one is in blast 15 hours, and the other 8 hours. Average melting rate is 18 to 20 tons per hour. Cupola beds are 52 inches above the top tuyeres, and 4000-pound iron charges with 480-pound coke splits are used. Typical analysis of the iron shows 3.25 per cent total carbon, 2.40 per cent silicon, 0.110 per cent sulphur, 0.23 per cent phosphorus, and 0.60 per cent manganese.

The iron has a traverse strength of 2650 pounds on the standard A. S. T. M. bar with 0.26-inch deflection, and the brinell hardness of the bar is 228. Tensile strength determinations show a range from 35,000 to 40,000 pounds per square inch. Metal at the cupola spout averages 2800 degrees Fahr. Cylindrical covered mixing ladles and main transportation ladles are employed, and have been found to result in an appreciable conservation of heat. For example in the transportation ladles a heat loss of 15 to 23 degrees Fahr. per minute occurred with open ladles while with closed, insulated ladles the loss is 8 to 10 degrees per minute.

Addition of alloys where required is made in the transportation ladles. In some cases Mexican graphite is added to reduce the tendency toward formation of hard corners and edges. Close control is maintained on the total carbon content of the iron through frequent chemical determinations, and adjustment of the coke splits. Chill characteristics of the iron are determined by chill test bars poured every 15 minutes. The bars are ¾ x 2 x 4 inches. One face is cast against a chill, and the others are formed in a dry sand core.

Company Expands

Whitnall Conveyor & Mfg. Co., Whitewater, Wis., established in 1935, recently completed an enlargement of its manufacturing facilities and capitalization. H. E. Whitnall, formerly president of the Northern Conveyor & Mfg. Co., is vice president of the company in charge of sales. P. H. Dorr, chairman of the board of the Shaler Co., Waupun, Wis., recently was elected president of the Whitnall company. The company's materials handling line has been redesigned and augmented.



To Bronze in Valves: **PRESSURE TIGHTNESS.**

Makers of valves for steam engineering, which must stand up under pressure and elevated temperatures, find that a little Nickel goes a long way. It takes only 3 to 5% of Nickel added to the bronze used here, to assure a pressure tight material and to increase tensile strength, compression strength and hardness, with little or no loss in ductility. These valves made by Scott Valve Co., Detroit.

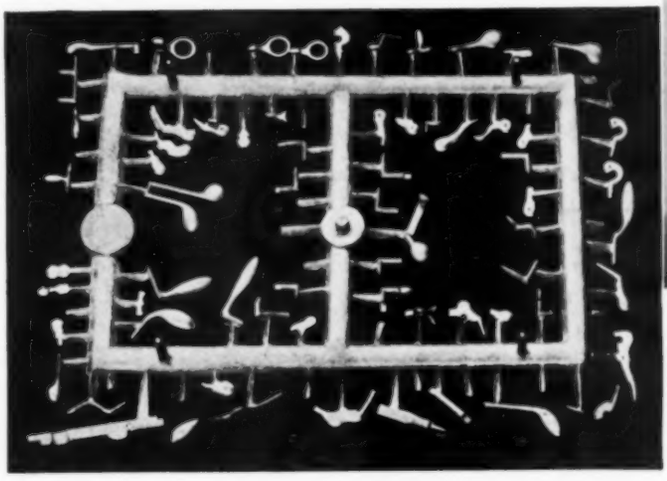
To Bronze in Worm Gear: **LONG WEAR.**

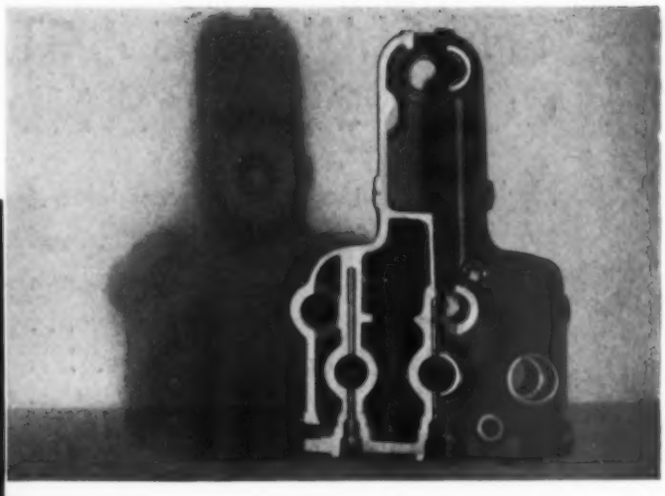
Here's a speed reducer worm gear of cast Nickel Bronze. It has carried heavy loads for years; its extra strength and resistance to wear comes largely from its uniformly high mechanical properties. Made by Cleveland Worm and Gear Co.; the worm itself is a low carbon Nickel Steel.

what each NEEDS... NICKEL gives!

To Cast Nickel Silver in Clarinet Keys: **FLUIDITY.**

Below is a single casting comprising a number of Nickel Silver clarinet keys. The makers, C. G. Conn Band Instrument Co., have standardized on this method of production. They cut off and machine the separate keys later. Even for light sections such as these, Nickel assures a sound dense structure.





To Cast Bronze in Lubricator Body: **UNIFORMITY.**

It takes only about 1% Nickel to give this locomotive lubricator casting just what it needs: Light and heavy sections must be uniform and pressure tight. And although Nickel raises hardness, the alloy is readily machinable. Cast by Detroit Lubricator Co.

• Even as little as ½ to 1% Nickel appreciably increases the yield point and tensile strength of bronzes. Consultation is invited on your casting problems.

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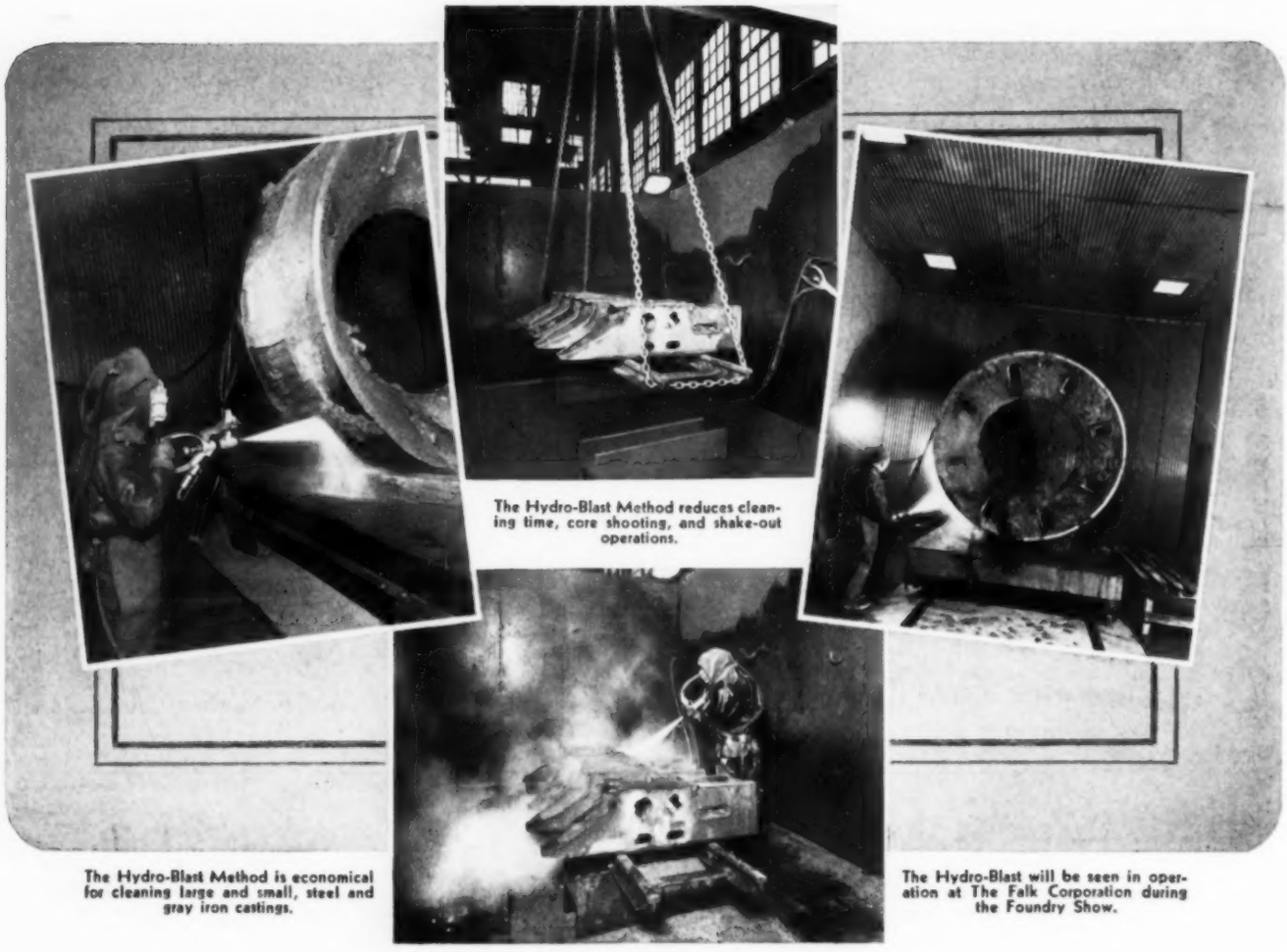

The Hydro-Blast Method reduces cleaning time, core shooting, and shake-out operations.

The Hydro-Blast Method is economical for cleaning large and small, steel and gray iron castings.

The Hydro-Blast will be seen in operation at The Falk Corporation during the Foundry Show.

THE SLUICING ACTION REMOVES ALL CORE SAND AND BLASTING SAND

Hydro-Blast is the proved successful wet sand blasting system . . . for production and jobbing foundries . . . for cleaning large and small, steel and gray iron castings . . . for shooting hard complicated cores. It is today's one-man, trouble-free method for cleaning the work, removing the sand, and classifying it.

The sluicing action removes all core sand and blasting sand . . . delivers the sand to the receiving sump for reclaiming or elimination. The operator works close to the casting to accomplish the breaking out and removal of hard complicated cores. Hydro-Blast saves cleaning time, core shooting, and shakeout operations.

THE HYDRO-BLAST CORPORATION

111 W. Washington Street, Chicago, Ill.

HYDRO-BLAST

THE PROVED WET SAND CLEANING METHOD

Cast Shafts Possess Advantages

(*Concluded from page* 61)

elongation, 2.5 to 3 per cent, and brinell hardness 250-320.

At the present time nickel-molybdenum gray cast irons have been adopted as standard by several manufacturers. The significance of this development can be emphasized best by showing a number of illustrations from which you may observe the diversity in design and size as indicated in Figs. 11, 15, 16, 17, 19, 20, 21, 22, 23 and 27.

Some of these cranks have been in service for three years or more; while others are running in experimental engines with very satisfactory results. Campbell, Wyant & Cannon Foundry Co. began this development prior to 1930, but since this time it has progressed rapidly. To date several thousand cranks produced by that firm have gone into nearly every type of service including automobiles, trucks, tractors, marine, and stationary engines.

This metal known as "Proferall 3 X" (processed ferrous alloyed) is made either from metal duplexed in the electric furnace from the cupola or cold melted in an electric furnace: Total carbon, 2.40-2.80 per cent; silicon, 2.25-2.75 per cent; sulphur, 0.10 per cent max.; phosphorus, 0.15 per cent max.; manganese, 0.80-1.20 per cent; nickel, 1.00-1.20 per cent, and molybdenum, 1.00-1.20 per cent. Tensile strength ranges from 60,000 to 80,000 pounds per square inch and brinell hardness number 265 to 320 as cast.

No heat treatment is required and the same advantages may be claimed as listed under steel. The large diesel shaft, Fig. 19, weighs 1920 pounds as cast, while a forging weighed approximately 3600 pounds. It is not possible to compare the finished weights, as a forging could not be machined to the extent to which the casting has been cored out.

The Caterpillar Tractor Co., Peoria, Ill., was the first to adopt a nickel-molybdenum gray cast iron crankshaft as a standard part for its two-cylinder starting gas engine. This crank is unique in that it represents the production of high strength iron direct from the cupola using high steel mixes and graphitizing in the ladle.

With several years of successful service in the background it is proven that by proper foundry control reliable castings are a certainty. Fig. 25 shows methods of gating and machining as developed by the Caterpillar Tractor Co. The composition of starting engine crankshafts is as follows: Total carbon, 2.95-3.05 per cent; silicon, 2.00-2.10 per cent; nickel, 1.50-1.60 per cent; molybdenum, 0.75-0.85 per cent; manganese, 0.70-0.80 per cent; sulphur, 0.06-0.08 per cent, and phosphorus, 0.05-0.07 per cent. Tensile strength is given as 50,000 pounds per square inch minimum, and brinell hardness number 260-280.

An illustration of the wide use to which alloyed gray iron cranks have advanced may be gained from Fig. 12. While these applications are relatively small in size, when compared to the size of a diesel crank, nevertheless they are of relative importance from the standpoint of dependability. These castings were made by Frank Foundries Corp., Moline, Ill., and are known as "Frankite."

Composition Varies by Weight

Two types of alloy iron are employed for large and small work. For the large crankshafts the composition is: Total carbon, 2.75 per cent; silicon, 1.90 per cent; manganese, 0.75 per cent; nickel, 1.50 per cent, and molybdenum, 0.75 per cent. For small cranks the analysis is: Total carbon, 3.00 per cent; silicon, 2.30 per cent; manganese, 0.55 per cent; nickel, 1.00 per cent, and molybdenum, 0.50 per cent. In both types the sulphur is 0.08 per cent maximum, and the phosphorus, 0.20 per cent maximum. The metal is duplexed in the cupola and electric furnace, and the tensile strength is given as 50,000 pounds per square inch minimum, and the brinell hardness number, 230 to 280.

In addition to the several compositions already mentioned there are a great many others, such as—"Meehanite," "Gunite," "Gun Iron," etc. The producers of these trade marked castings are to be complimented on the splendid job they have done in advancing the *art* of founding to the science of casting.

In conclusion, the author wishes to express his appreciation to the men of the companies already referred to and to Messrs. Eash, Wood, and Hergenroether of the International Nickel Co. for their assistance in the preparation of this paper.

Organize Company

Transmission Engineering Co., San Francisco, has been organized to serve as a manufacturer's agency by A. A. Pederson, former sales manager of the United Iron Works, and S. O. Otrich of the S. O. Otrich Co., both of San Francisco. The concern represents the Stearns Magnetic Mfg. Co., Milwaukee.

Chicago Foundrymen Study Melting

Melting furnaces were discussed before the ferrous group by three speakers at the monthly meeting of the Chicago chapter, American Foundrymen's association, March 8. About 150 attended. L. H. Rudesill, Griffin Wheel Co., Chicago, acted as technical chairman.

H. B. Schulz, South works, Carnegie-Illinois Steel Corp., described operations of the electric arc furnace in production of casting and ingot metal. Close control over the pouring temperatures was emphasized as an important point to be observed. Mr. Schulz detailed the melting practice for different types of alloy steels, including stainless. The latter is hard on the furnace bottom because of the high temperature and length of time the charge remains in the furnace.

A brief history of the air furnace was presented by M. F. Becker, Whiting Corp., Harvey, Ill. About one-fifth of the metal melted in air furnaces is gray iron. Slides were shown of recent installations, including that of the Ford Motor Co. where the air furnace is used in connection with the cupola and electric furnace in producing 560 tons of metal daily.

Equipment, materials and practice are the essentials to be watched in cupola operations, according to W. A. Hambley, foundry metallurgist, Studebaker Corp., South Bend, Ind. The cupola bottom should be designed carefully to last through the heat. Size of coke used is a debatable point, the speaker preferring the largest obtainable thereby securing the hottest metal with the least amount of fuel. Mr. Hambley described the general practice employed by Studebaker in gray iron melting.

The nonferrous group had as its speaker David W. Curry, International Nickel Co., New York. Presiding was A. D. Lynch, Hammond Brass Works, chairman of the group. Approximately 40 members were present.

Mr. Curry presented interesting details of alloys and mixture and molding practices for some of newer nonferrous foundry alloys, especially treating the nickel silver alloys. He showed tables of properties and illustrations of applications. The illustrations portrayed peculiarities in gating and risering as applied to the production of castings from the alloys under consideration.

H. W. Porter & Co., Newark, N. J., has been appointed distributor of the General Refractories Co., Philadelphia, in the Newark territory.

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PATENTS		FILED	ISSUED
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U. S.	No. 1,509,478	Jan. 21, 1921	Sept. 23, 1924
U. S.	No. 1,657,573	July 1, 1924	Jan. 31, 1928
Canada	249,251	March 8, 1924	May 5, 1925
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● Each invoice rendered by Harry Haze, Inc., covering the sale of Bentonite to foundry customers carries a license under the above patents covering the use of Bentonite so invoiced—*for your protection!*

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Play safe! Order your Bentonite from Harry Haze, Inc.,—the world's pioneer supplier of this material.

USE ASSURED QUALITY BENTONITE

● Harry Haze, Inc., has pioneered in the sale of the highest quality Bentonite available. Every bag of Bentonite shipped by us is strictly laboratory controlled, highly colloidal, and the best, genuine Wyoming Bentonite money can buy.

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TYPE W WATER SPRAY DYNAMIC PRECIPITATOR

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The Type W Roto-Clone combines the scrubbing effect of water sprays with the proven dynamic principle of dust precipitation and is particularly applicable to the collecting of dusts that can be wetted with water.

Exclusive features of this latest Roto-Clone development are—COMPLETE DUST ABATEMENT, MINIMUM WATER REQUIREMENT, LOW POWER CONSUMPTION, SMALL SPACE REQUIREMENT. The collected dust, delivered in the form of sludge is easily disposed of without creating a secondary dust problem.

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TYPE W
ROTO-CLONE
WATER SPRAY DYNAMIC PRECIPITATOR

Obituary

CLARE M. BOLICH, 50, for many years president and general manager of the Nickel Plate Foundry Co., Cleveland, died in his home, that city, April 3. Mr. Bolich was born and received his early education in Ashland, Pa. Later he attended Wooster college and Ohio Northern university. Following graduation he taught school for 3 years in Brimfield, O., schools. In 1908 he became purchasing agent for the Reliance Electric & Engineering Co., Cleveland. In 1913 he became manager of the Collinwood Foundry Co. With a group of former employes of the Collinwood Foundry Co., he organized the Nickel Plate Foundry Co. in 1919 and remained with that company as president and general manager until his health failed several months ago.

♦ ♦ ♦

J. H. Andre, purchasing agent and assistant general manager, Bettendorf Co., Bettendorf, Iowa, died while en route to Chicago March 24. He had been associated with the company for about 30 years.

♦ ♦ ♦

Dr. Frederick C. Langenberg, vice president in charge of research of the United States Pipe & Foundry Co., Burlington, N. J., died suddenly in his home at Edgewater Park, N. J., April 4. He was a widely known metallurgist.

♦ ♦ ♦

Charles Frederick North, 42, vice president and sales manager of the Green Bay Foundry & Machine Works, Green Bay, Wis., died recently in Akron, O. Since the close of the World war he had been associated with his father, R. A. North, president of the Green Bay company.

♦ ♦ ♦

Thomas Vincent Blodgett, 46, sales manager of the Lebanon Steel Foundry, Lebanon, Pa., died March 28 in Lebanon. He was born in Wilkes-Barre, Pa., in 1890 and early in life moved to Bethlehem, Pa., with his parents. He studied at Lehigh university and took a special course in drawing and engineering at Bethlehem Steel Co. Mr. Blodgett worked for that company in various capacities until 1920. In that year he became associated with the Lebanon company and served as chief inspector and sales engineer until 1925 when he became sales manager. Mr. Blodgett was an active member in the Lehigh chapter of the American Society of Metals and was a member of the Steel Founders' Society of America and the Alloy Casting association.

* * *

Dr. Alfred Douglas Flinn, 67, director of the Engineering Foundation and a leader in organized engineering for many years, died March 14 at Scarsdale, N. Y. Dr. Flinn was a Fellow of the American Association for the Advancement of Science, a member of the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Iron and Steel institute and numerous other societies.

♦ ♦ ♦

Prof. Elihu Thomson, 83, one of the founders of the General Electric Co., died at his home in Swampscott, Mass., March 13. One of America's leading pioneers in the field of electrical science, he held over 700 patents in the United States alone. Prof. Thomson's name was given to the Thomson-Houston Electric Co., organized in 1883, and merged in 1892 with the Edison General Electric Co. to form the General Electric Co. For more than 15 years he was director of the Thomson Research laboratory in West Lynn, Mass. Prof. Thomson was president of the International Electrical Congress in 1904 and president of the Electrochemical Congress in 1910 and 1911. He was a member of many engineering societies throughout the world.

♦ ♦ ♦

George Batty, 49, steel consultant, died March 20 in Drexel Plaza, Philadelphia. Mr. Batty was born in England and received his technical education at Sheffield university. For the next 11 years he was connected with a number of Sheffield firms as steelmaker or works manager, in the manufacture of tool and special steels. In 1920 Mr. Batty spent several months in the United States as consultant for the Ford Motor Co., Detroit, and then returned to England. He was appointed works manager of the National Steel Foundry Ltd., Leven, N. B., in 1923 and later became technical director of that company. In 1927-28 Mr. Batty operated as a steel foundry consultant at Detroit and then became director of the Steel Castings Development bureau, Philadelphia. He was active in affairs of the American Foundrymen's association and had presented numerous papers dealing with various phases of steel castings production before conventions of the A.F.A.

Pittsburgh Group Features Sand

Proving the popularity of the subject "Sand Control in the Foundry," an unusually well attended meeting was held by the Pittsburgh Foundrymen's association at the Fort Pitt hotel, Monday evening, March 15. Harry W. Dietert, Harry W. Dietert Co., Detroit, discussed the application of sand testing in the foundry. The meeting was conducted in the nature of a shop operator's course on molding sand. Discussion leader was George Miklos, Westinghouse Electric & Mfg. Co.

Mr. Dietert pointed out that sand testing enables control of moisture content, permeability, green strength, dry strength and fineness. He stressed the fact that moisture control is an important step in the preparation of sand for molding. Grain size defines the weight of casting that should be molded in the sand. The speaker mentioned that maintaining the sand at a uniform and suitable working condition will do much to produce quality castings at a low production cost. Mr. Dietert stated that sand control records are well worked out today and that sand testing is of value when the figures are recorded and compared with castings produced.

Topics brought up in the question period included contraction points of various clays; synthetic sand grain structure; deformation; and problems encountered in various sizes of castings.

A nominating committee was appointed to select nominees for officers for the coming year.

Missouri Founders Plan Conference

The St. Louis District Chapter of the American Foundrymen's association is making preliminary plans for a two-day regional conference to be held in collaboration with the Rolla School of Mines and Metallurgy, Rolla, Mo. A definite date for the meeting has not been established, although the last week in October tentatively has been set.

Arrangements for the conference will be made by committees having the following chairmen: G. S. Haley, housing and transportation; C. R. Culling, entertainment; J. W. Kelin, finance and advertising; Web Kammerer, program; and L. J. Desparois, speakers. Charles H. Fulton is director of the Rolla School of Mines and Metallurgy.

The Iron Casting Guild of Osaka, Japan, has been organized and articles adopted as drafted by committee.

YOU CAN

CLEAN CASTINGS

BEFORE YOU CAST THEM

Use a Product for your moulds and cores that has been made expressly for that purpose!

McCORMICK
VULCAN BLACKING
FOUNDRY FACINGS
LION BINDER
EASY CLEANER CORE COMPOUND
SUPERIOR PLUMBAGO
SILKOTE

VULCAN BLACKING is the material to use on dry sand molds and cores to have the sand actually fall away from the castings during shaking out.

SUPERIOR PLUMBAGO is the material to use on green sand molds.

EASY CLEANER CORE COMPOUND makes a core that cleans out with the minimum of labor.

LION BINDER should be used for pasting cores - - and in oil sand cores to speed up production and reduce core making costs.

Information on how to use these materials for your work can be obtained from our service men at Booths 72 and 74, Mechanics Hall, during the Foundrymen's Convention in Milwaukee, May 3rd to 7th - - - or by mail if you won't be there.

J. S. McCORMICK CO.
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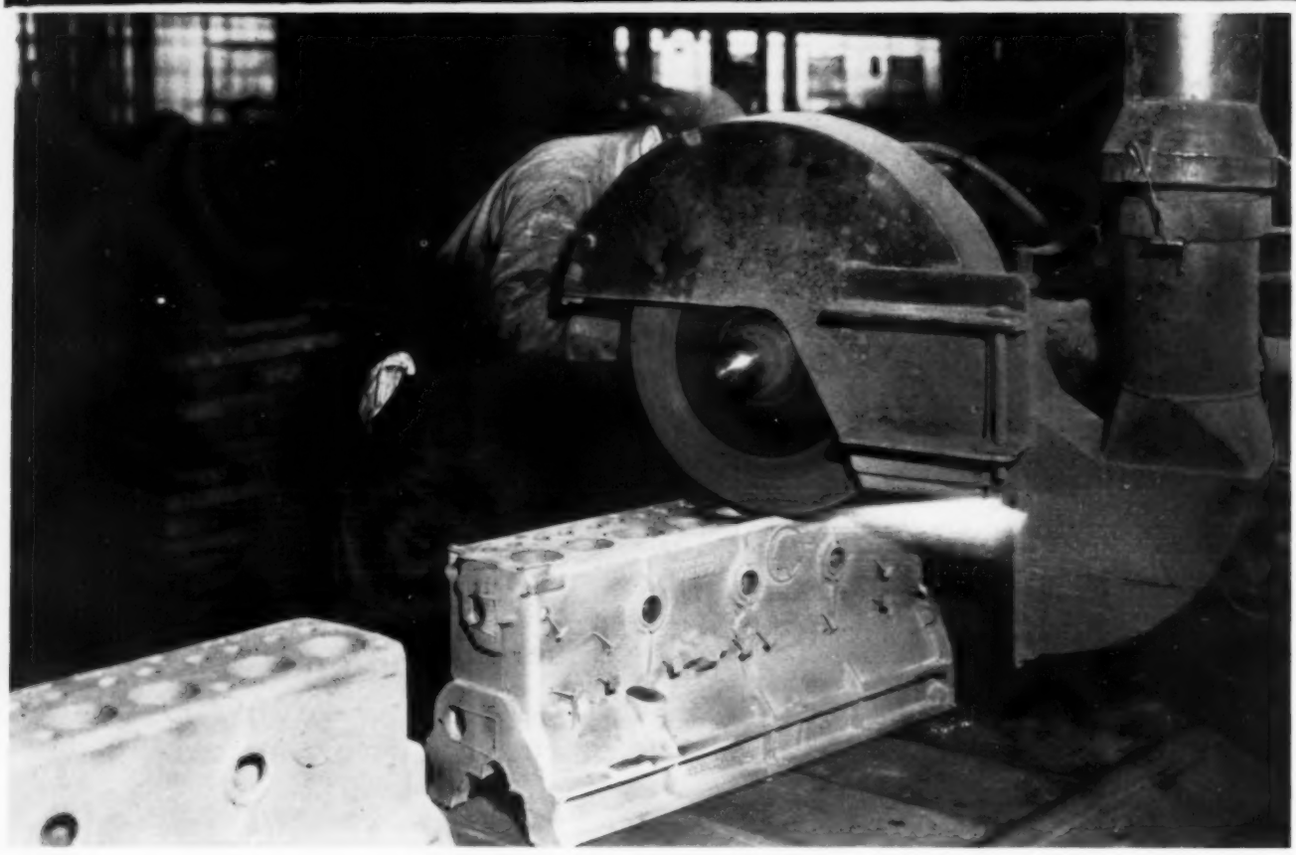
MACKLIN
Grinding Wheels



Swing frame grinders equipped with Macklin Grinding Wheels serve the automotive industry on many jobs. Illustration shows Macklin Wheel grinding cylinder block castings. Proper selection of wheels assures efficient and economical results. "Protect Your Production" with Macklin Grinding Wheels.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS—JACKSON, MICHIGAN, U. S. A.

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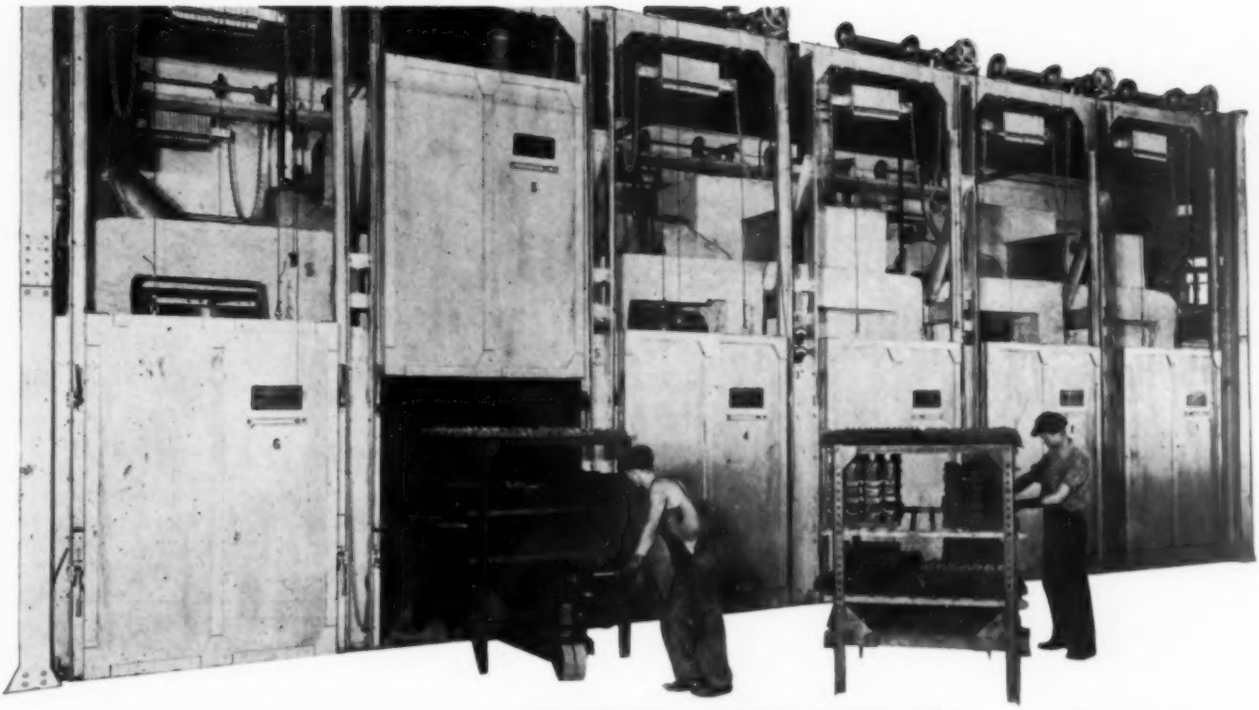

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• Coleman core and mold ovens are increasing production and reducing costs in leading foundries throughout the country. We are genuinely proud of the service Coleman ovens have rendered the foundry industry, during the past thirty years.

Whatever your requirements may be—a small portable oven, or a large continuous installation—it will pay you to take advantage of Coleman engineering and experience.

Drop around to our booth at the show and let's talk over your core baking and mold drying problems.

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BUILDERS OF COLEMAN AND SWARTWOUT OVENS
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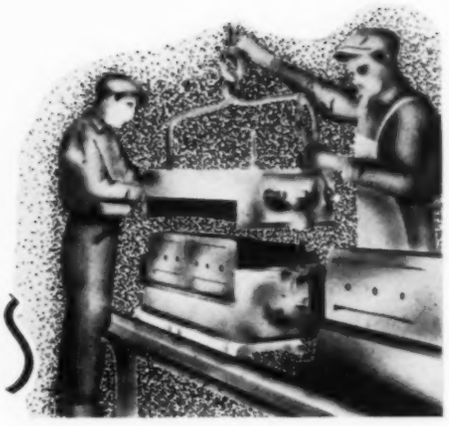


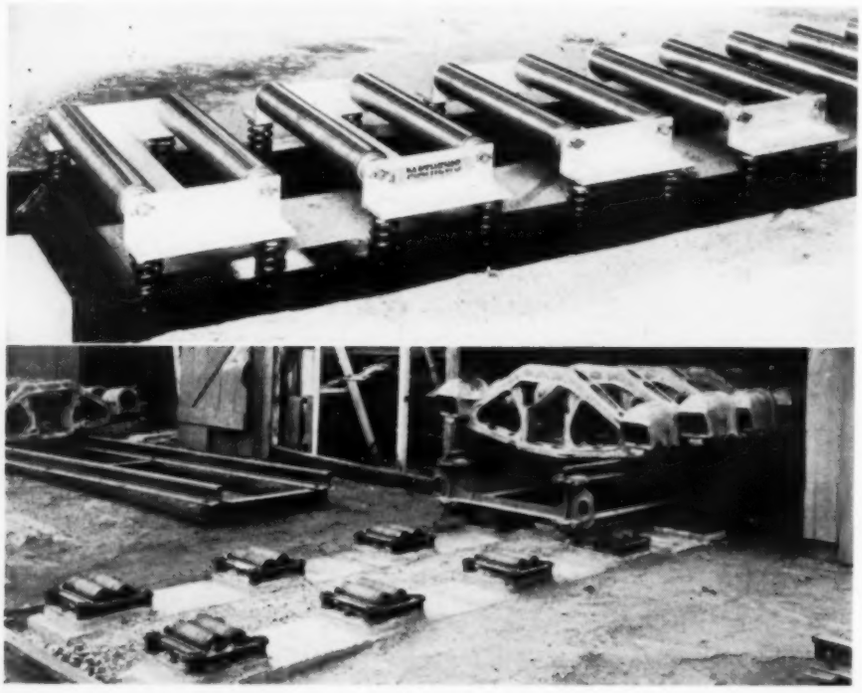
Roller Conveyor Is Cushioned

Mathews Conveyer Co., Ellwood City, Pa., recently has developed the shock-absorbing resiliently mounted roller conveyor shown in the accompanying illustration. The development has issued from the necessity of finding some means of causing each roller on a conveyor to carry its proportionate share of the load. Previously roller conveyors have been built on solid mountings, permitting free rotation of the rollers but not allowing for vertical or transverse movement.

With resiliency in the roller mountings, brought about by 3-coil springs, it is claimed each roller carries its share of the load and bearing friction is reduced. The coefficient of friction used to calculate the effort required to move loads over the conveyor is said to have been reduced considerably, also, as a result of the cushion effect produced.

The first step in keeping pace with increasing demands on roller conveyors was to build them heavier, consistent with the loads to be carried. This did not overcome high maintenance cost and abuse of the conveyor bearings. Development of the Mathews company unit has resulted from a series of trials ranging over a period of six months. Even distribution of weight was the ultimate objective in each case.

One test was experienced in a steel foundry. A conveyor was installed for handling molds weighing 8220 pounds. The molds were 40 inches long and carried on metal skids, so the rollers were spaced on 4-inch centers so the mold at all times would be supported by 10 rollers. With each roller carrying its proportionate share of the weight, the burden on each roller figured 811 pounds. It was found that, because of an uneven bottom on the mold and distorted skids, the load was being carried by only two rollers. Each roller, therefore, supported 4110 pounds instead of 811 pounds as intended.



Resiliency is brought about by 3-coil springs and the load is evenly distributed to each roller

Designs Stabilizer For Trailers

Fruehauf Trailer Co., Detroit, has developed a new load stabilizer to be used on dump trailers. Its purpose is to maintain equal loads on each spring at all times. By transferring the load over a torsion rod running across the chassis and connecting the two springs, the stabilizer is said to eliminate sagging of trailer springs when on uneven ground. On level roads, the stabilizer is a floating bar. The development is claimed to be effective also in eliminating body sway when dump trailers negotiate turns.

Band Saw

Walker-Turner Co. Inc., Plainfield, N. J., has made a new 16-inch heavy duty band saw. No section of the blade is exposed while sawing. The wheels are covered by guards in front and back while a special telescoping guard covers the section of the blade between the upper guide and the table. Capacity of the machine is 16 inches from the blade to the frame and 12 inches from the upper guide to the table. A calibrated quadrant regulates the table tilt to the maximum of 45 degrees. Ball bearings, reinforced table and wheels of rubber-faced iron are other features of the saw. In addition to this unit, the Walker-Turner Co. has built a new 3-in-1 belt-and-disk surfacer.

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On account of its design, it never fails to start instantly.

Its durability too, has been proven. The Master Match Plate Vibrator teamed with the new Master Vibrator Hose makes a combination far beyond anything in this line available today.

Our descriptive circular will be mailed to you promptly upon request.

You are cordially invited to visit the exhibit of latest developments in supplies and equipment for the wood and metal pattern shop, at the American Foundrymen's Association Show, May 3 to 7, at BOOTH NO. 5, Mechanics Hall, Milwaukee

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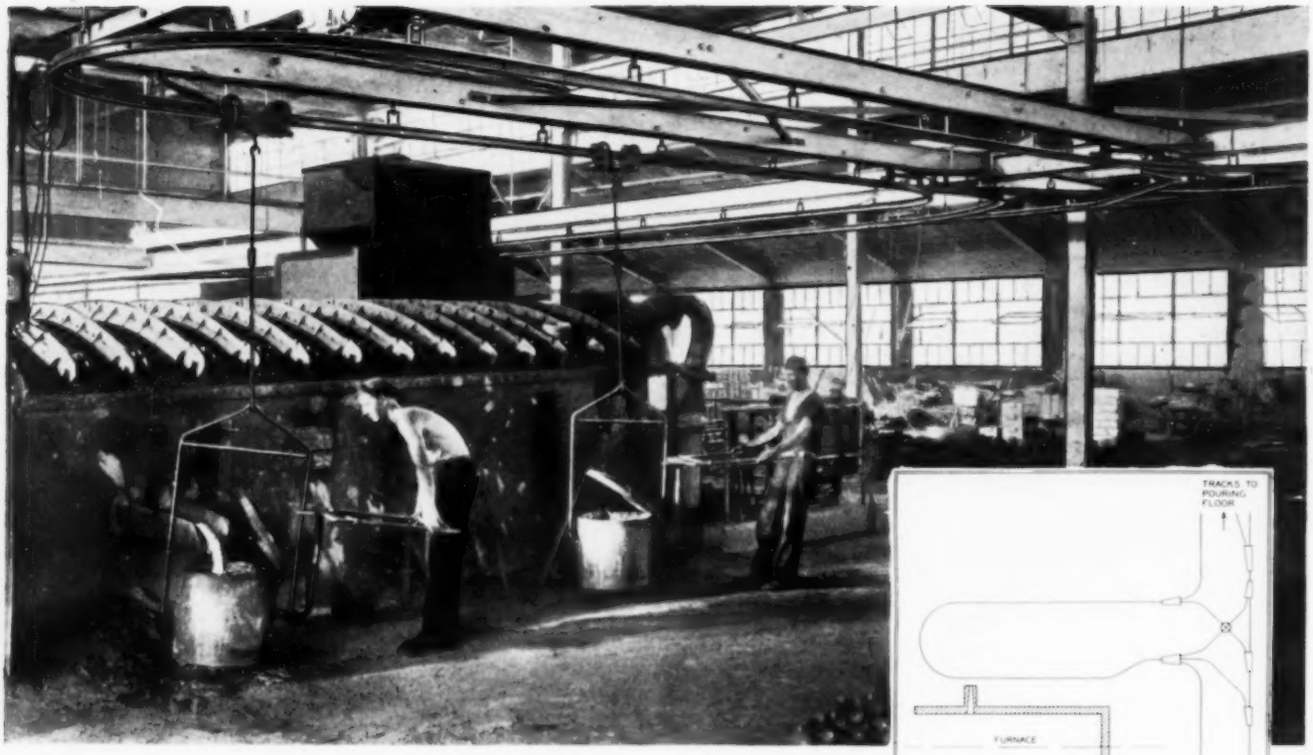
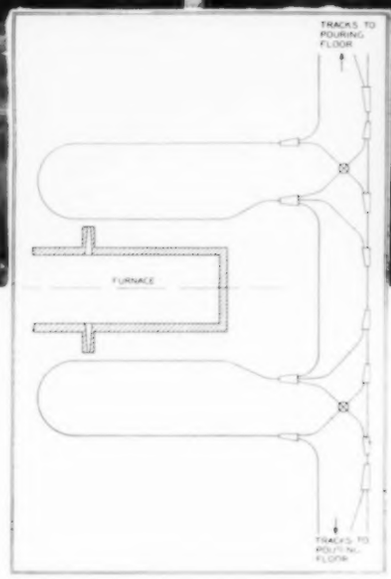
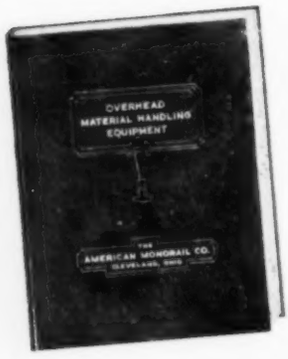




Engineered handling

for LOW COST POURING
GREATER PRODUCTION
IMPROVED CASTINGS



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Used as a standard reference in many technical libraries.

Plans for handling foundry materials often mean the difference between profit and loss. Handling that involves considerable labor must be made easy and methods provided for quick transportation of hot metal from cupola to molds.

Time after time American MonoRail equipment is selected wholly upon the engineering skill demonstrated in the proposed installation plan.

With precision bearings for easy rolling trolleys and forgings for all wearing parts American Mono-Rail equipment produces the kind of handling recommended. Recent installations prove the value of modern layout. Let our engineers suggest ways of improving your handling system.

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"CERTIFIED" STEEL ABRASIVES

will increase your Blast Cleaning production and reduce your Blast Cleaning cost because—

20 bags of "Certified" Steel Grit, or Steel Shot, will do the work of a carload of sand.
"Certified" Abrasives are sharper, therefore cut quicker.
"Certified" Abrasives are easily cleaned, and may be used over and over again.
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Most foundries are now specifying "Certified" Steel Shot or Grit and saving money. May we demonstrate to you?

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PITTSBURGH, PENNA.

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Furnace Practice is Vital

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THE BEST · KNOWN NAME IN IRON

WHILE furnace practice has changed—improved and become more dependable—it is still the major factor in determining iron quality, for *iron is made in the furnace*. The factors responsible for bringing Hanna Furnace practice to its present peak of excellence are these: practical lessons learned by 70 years devoted to producing merchant iron, constant research and development work, and the proud devotion of men who have had "iron making" literally bred into them for generations. Furnace practice is largely responsible for making Hanna the best-known name in iron.

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Grades:
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NATIONAL STEEL

MERCHANT PIG IRON DIVISION OF

NATIONAL STEEL CORPORATION

Conveyor Switch Is Automatic

Standard Conveyor Co., North St. Paul, Minn., has developed a full-powered radial switch for use with roller conveyors, permitting immediate discharge of commodities at any point without manual effort other than pressing a button. In operation the switch is moved to its various positions by power. Conveyor rollers are said to be driven positively whetner the switch is in position for straight ahead travel or for discharge to a lateral line.

A power conveyor, utilizing the new radial switch, can be set horizontal throughout its distance of travel, at the same time permitting discharge at a desired point. The switch stops when it has reached the discharge position and automatically returns to its normal position without further attention. The unit is available in different types for heavy and light commodity handling.

Equip Grinders With Enclosed Motor

Hammond Machinery Builders Inc., Kalamazoo, Mich., has equipped all of its grinders of 3 horsepower and over with totally enclosed fan-cooled motors. As illustrated, the rotor and stator on these units are in an enclosed chamber sealed against the entrance of foreign matter. Two fans force cooling air around the outside of this chamber, serving to extract heat from the motor.

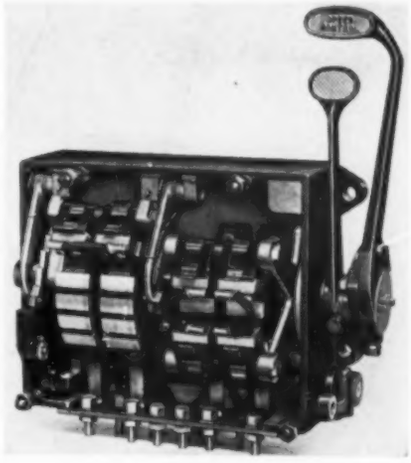
The fan-cooled type motor is said to withstand greater overload with a lower temperature rise. The company's grinders are equipped with automatic starters with thermal overload protection, oversize ball bearings, adjustable eye shields made of shatterless glass and push button remote control.

Rotor and stator are in an enclosed chamber sealed against dirt

Changes Design Of Controller

Automatic Transportation Co., 101 West Eighty-seventh street, Chicago, has made a change in the design of its industrial truck controller. The new unit has a rotary acting motor type brush mounting. Also the stator segments are commutator type, unit molded into permanent insulated base with no loose segments or separate parts.

Brushes in the unit are provided with a constant spring tension which is self compensating. Other features claimed include: Built-in dynamic brake control; heavy durable jumpers on brush connectors; contactor switch control; and large contact areas.



Brushes in the unit are provided with a constant spring tension

Movable Floor for Truck Bodies

Easton Car & Construction Co., Easton, Pa., has developed a new movable floor for truck bodies. It consists of a single sheet of durable cord rubber belting supported beneath by tiers of steel rollers. The belting is long enough to be rolled one complete floor length to either end of the truck. Operation is carried out by a crank handle which is used to roll up the floor. This handle may be used at either end or either side of the truck. Complete movement of the floor from end to end of the truck body may be accomplished in a few seconds.

Respirator Has One Outlet Valve

Chicago Eye Shield Co., 2300 Warren boulevard, Chicago, has developed the respirator shown in the accompanying illustration. The filtering element is said to remove dust of microscopic fineness but to allow free passage of air. There is only one filtering surface, and a supersensitive outlet valve is claimed to permit no inside air pressure.

An outlet valve is designed to prevent inside air pressure

A seal at the facial contour is effected with the aid of a soft metal band which is designed to serve not only as a precaution against breathing dust but also in the reducing of pressure at the headband.

Rotating-Cam Switch In Two Sizes

General Electric Co., Schenectady, N. Y., has designed a new line of rotating-cam switches for built-in control applications. Two sizes are available, rated 15 amperes continuous and 25 amperes continuous, both for 600 volts or less, with alternating current. Four standard controlling types are obtainable as follows: Single-speed motors for reversing; two-speed separate-winding motors for nonreversing or for one speed forward and one reverse; two-speed single-winding motors for nonreversing or for one speed forward and one reverse; and three or four-speed motors for three or four speeds forward and one reverse.

The flanges available for flush-mounting make it possible for the switches to be built-in by providing an opening and drilling in the face of the machine. Each switch is completely enclosed in a steel housing. For non-built-in requirements, the units are available as standard switches without the flanges used for flush-mounting on machines.

Dust tight covers, with felt gaskets riveted around edges, can be applied.

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Multiple Cams Used In New Clutch

Morse Chain Co., Ithaca, N. Y., has designed a high-torque indexing and free-wheeling clutch for use in machine tools, stokers, etc. The clutch uses multiple cams spaced alternately with hardened ground steel rollers to distribute the load evenly on each cam.

Cam action is governed by two leaf springs that contact shouldered surfaces milled at each end of the cams. The point of spring contact is such that a rocking action is created with the fulcrum point at the center of the cams. When the speed of the inner and out races synchronize, the cams immediately roll into a locking or driving position. A ball bearing at one end separates the members and stabilizes the load. Opposite end of the unit is prepared for the attachment of sprocket wheel, ratchet arm or belt pulley.

Detect Temperature By New Couple

Leeds & Northrup Co., 4908 Stenton avenue, Philadelphia, has designed a new temperature detector which is mounted on the outside wall of the furnace. This specialized couple sights into a simple target-tube. Closed end of the tube projects into the furnace and is always at furnace temperature, to which the detector outside responds. Ordinary copper leadwires connect the detector to a standard potentiometer which measures, indicates, records and holds the temperature of the furnace, through a relay and valve-drive mechanism.

The unit is hermetically sealed and is said to be unaffected by contaminating gases or dusts and pounding hammers.

Light Reflector

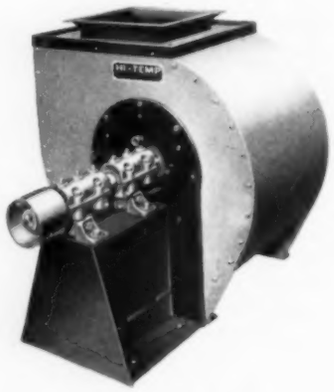
Benjamin Electric Mfg. Co., Des Plaines, Ill., has developed a new luminous top diffusing reflector for use with the silver-bowl type lamps. The reflector has a deep, overhanging skirt which shields the portion of the lamp above the silvered bowl from view at normal angles of vision. An opal glass section in the neck of the reflector permits approximately 5 per cent of the light output of the reflector to reach the ceiling.

When used with silver bowl lamps there is no cutoff with this reflector as the light source cannot be seen from any position. White bowl lamps can be substituted in the reflector. A special diffusing surface porcelain enamel has been used. The reflector is 20 inches in diameter and is available in two sizes, for 200 and 300 to 500 watt lamps.

Fans Have Safety Water Valve

General Combustion Corp., Engineering building, Chicago, offers two ranges, 600 to 900 degrees Fahr. and 1050 to 1400 degrees Fahr., in its new line of fans shown in the accompanying illustration. The units are suitable for heat interchangers, furnace heat recirculation and similar applications where convected heat at high temperatures must be conveyed to processes or disposed of. Steel shafts rotate in water cooled bearings.

Provision is made for the installation of a safety water valve which prevents operation of the fan without circulation of the bearing cooling water. The water valve opens automatically when the fan is started and closes when it is stopped. Fans are made with two steel housings with high temperature insulation placed between in thicknesses from 3½ to 6½ inches depending on the operating temperature. The fans are self-supporting on their housing base and independent from the rotor and bearing support. Rotor assembly can be removed from the housing quickly, without blocking up the housing or disturbing inlet or outlet duct connections.



Rotor assembly can be removed from the housing quickly

A Correction

The melting temperature of a bismuth-lead alloy, developed by the Cerro de Pasco Copper Co., New York, for the production of patterns, was given incorrectly in the March issue of THE FOUNDRY. The alloy melts at 255 degrees Fahr.

Enlarges Respirator Filter Chambers

H. S. Cover, South Bend, Ind., has designed a plate respirator featuring an enlarged area in its double filter chambers. Filter pads are 4⅜ inches in diameter and have a clear entrance filter aperture for both pads of more than 24 square inches. Face piece is of standard construction with large off-set filter plate attached.

Filtered air passes between plate extrusions to the protected opening and into the respirator interior. Marginal edge of the plate has an inwardly curved edge to anchor the filter pads securely and prevent leakage. Without filter pads, the respirator weighs 4 ounces.

Revolving Discharge In Unit Heater

L. J. Wing Mfg. Co., Seventh avenue and Fourteenth street, New York, has built a revolving discharge heater which is claimed to involve a new principle in heat distribution. The moving air streams sweep slowly around through 360 degrees. The air velocity is sufficient to carry the heat to walls and remote corners. The constantly changing direction of flow causes the air to find its way around obstructions. The directed air stream delivers heat in the working area of plants and buildings.

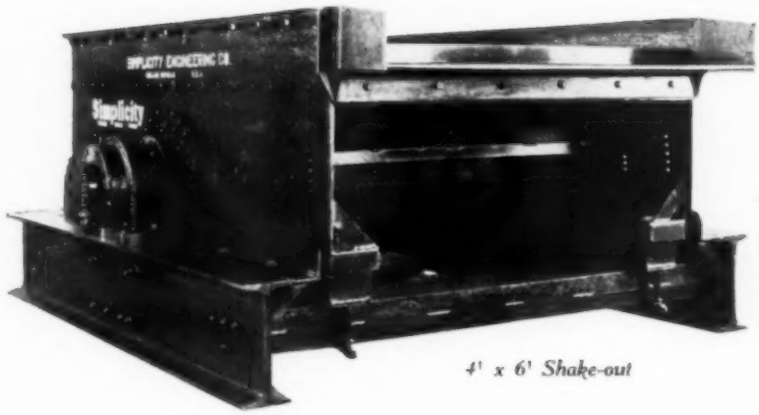
Valves Developed In Larger Sizes

Hancock Valve division of the Consolidated Ashcroft Hancock Co., Bridgeport, Conn., has completed the 1¼, 1½ and 2-inch sizes in globe and angle patterns of its new line of bronze valves. Sizes 1 inch and smaller were placed on the market a year ago. These valves are equipped with hard stainless steel seats and disks. Trim is heat treated to a hardness of 500 brinell and machined on a diamond boring machine.

Cement for Wheels

Midwest Abrasive Co., Detroit, has developed a new cement for polishing wheels, which, it is claimed, requires no heat in preparation. By the use of a special thinner, any density of cement required can be made up so that wheels of varying densities can be surfaced uniformly.

Simplicity Foundry Equipment



4' x 6' Shake-out

The Simplicity Shake-out is designed and built to handle a volume of flasks and castings or up to an eight ton flask on a single unit. Larger flasks can be handled on specially arranged tandem units. Rapid shake-out action, with important savings in flask wear and with cleaner castings, is secured with a big improvement in the working conditions of the men.

INVESTIGATE

It is now recognized that properly prepared sand is vital to securing good castings with a minimum loss. The shop desiring such prepared sand can use a Simplicity Sand Screen in their system. Where no system is available, the 2' x 3' Portable Screening and Conditioning unit is being used with very great success to handle heap sand and the discharge from Mullers. Where a greater capacity is desired, the 3' x 6' Semi-Portable unit illustrated here has no equal in the work it will do. This unit is moved around the shop with a crane and fed with a clam shell. In both the 2' x 3' and 3' x 6' Simplicity units, the sand is screened thru a fine mesh screen cloth, the lumps broken up by the breaker, the scrap and impurities removed, and the sand thoroughly conditioned with the moisture evenly blended by the action of the screen and by the blades of the sand-throwing unit, as they cut thru the stream of sand and throw it out in a fluffy condition ready for the molders. Users of these units report obtaining the finest sand ever secured with a low operation cost.

INVESTIGATE

Visit the Simplicity Booth of the Milwaukee Show; check the names on the rapidly growing list of users. Then see this equipment in actual operation. After this, have a Simplicity Engineer show you How and Where an equally valuable installation can be made in your own shop, whether it is a Jobbing or Production Foundry.

3' x 6' Semi-Portable Screen and Aerating Unit

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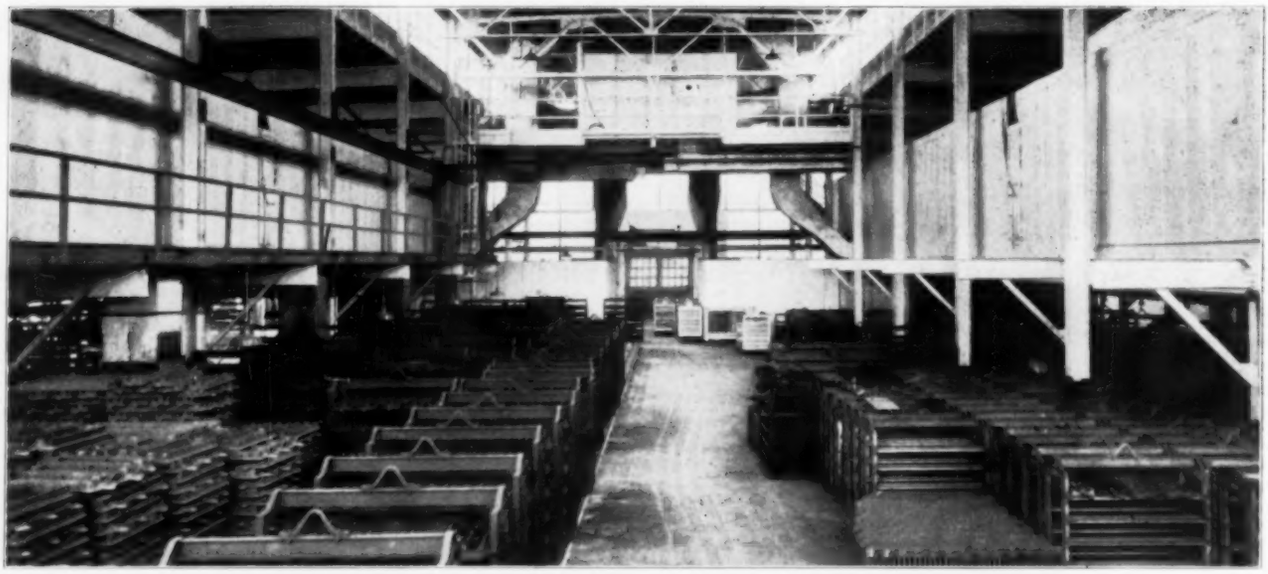


OVENS

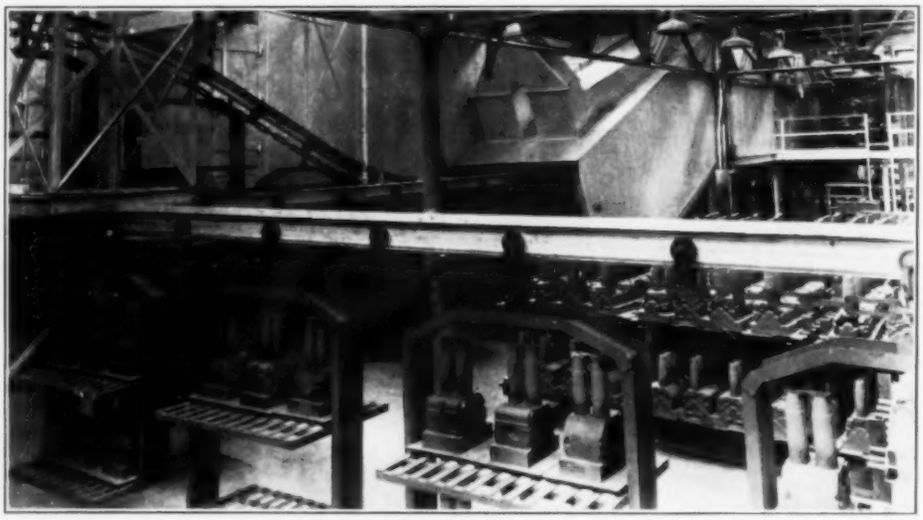
CORE and MOLD
PASTE DRYING
BLACKING
SHELF
RACK
CAR
Monorail Conveyor
Horizontal "
Vertical "

HEATED WITH

Gas, Oil
Coke or Coal
Butane, Propane
Electric Heat
Steam

BY MEANS OF

Air Heaters and
Conventional
Methods



WHERE?

American Radiator Co., Buffalo, N. Y.

Electric Autolite Co., Fostoria, O.

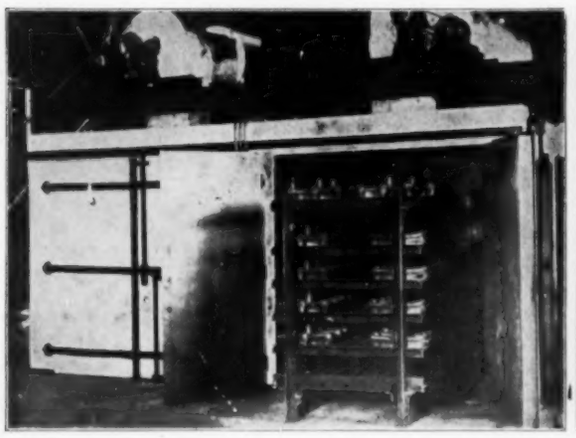
Harrison Radiator Corp'n, Lockport, N. Y.

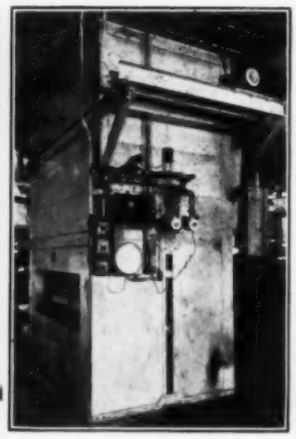
Packard Motor Car Co., Detroit, Mich.

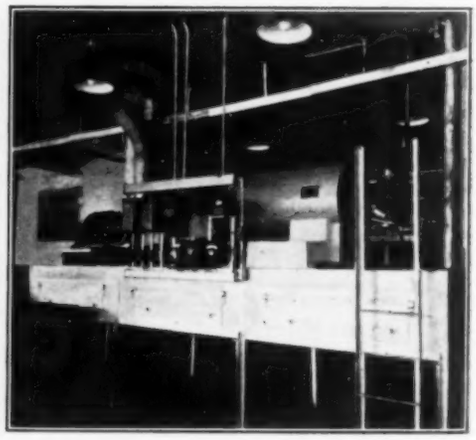
Studebaker Corp'n, South Bend, Ind.

HOW?

Preferably by appointment







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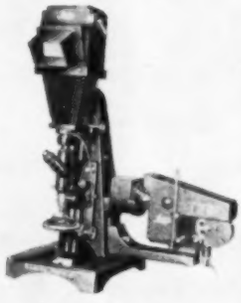

Leitz

INVITES FOUNDRYMEN

. . . to visit its Booth (Nos. 242-244) at the Convention in Milwaukee next May to examine Leitz Optical Instruments and discuss the many ways by which they can aid in production control and research. Among the instruments on display will be the following:

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MICROSCOPES

We have many models of microscopes for the study of metal grain structures. Among these are the Micro-Metallographs, large and small, which permit darkfield observation and observation under polarized lights—and such observations disclose useful facts concerning grain structures. Also inexpensive Microscopes with Camera Attachments for photomicrographic work.

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PHOTOMICROGRAPHIC EQUIPMENT

The Leitz **PANPHOT** is the central instrument in this display and rightly so. It is the metal industry's most versatile combination microscope and camera. Many a foundry could make use of this instrument.

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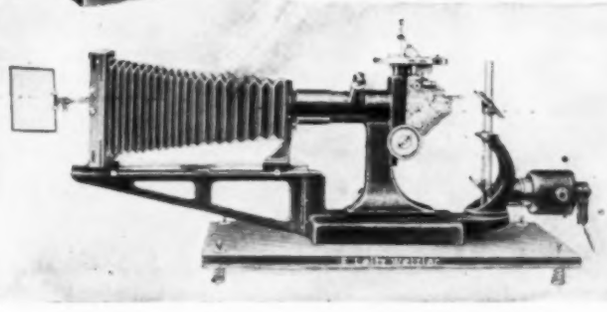

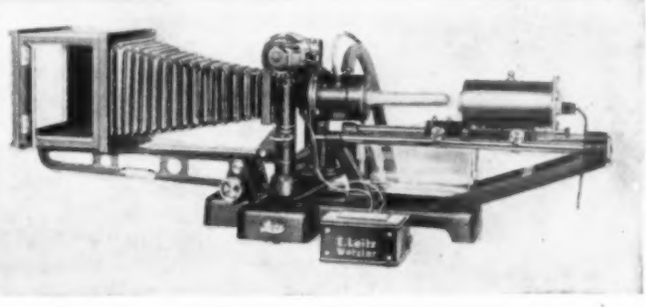

European Foundry Practice

Digest of Recent Literature Covering Various Phases of Castings Manufacture

Making Bells

Bells and Bell Founding, by N. G. Fraser, *The Australasian Engineer*, Sydney, Australia, Dec. 7, 1936.

In the introduction of this article the author presents an interesting historical account of bells and bell making, including data on the famous "Monarch of Moscow," the largest bell ever cast, and which required some 3 years work for completion. Manufacture of fairly large bells of good tone which are part of peals, is confined to specialists in such work as considerable detail work is necessary before proceeding with molding. Working drawings for the strickles used in forming the mold, with the weight of each bell as-cast, are made in the designing department. These are full size and the patternmaker by placing a piece of carbon paper between drawing and wood is able to trace the lines directly with a stylus. Hard, nonporous, well-seasoned pattern wood must be used to insure lack of distortion.

Each bell requires two strickles, one for striking up the exterior and the other the interior core. Strickles are checked carefully before use. General practice is to mold the largest or tenor bell first as a longer time is required for drying the mold. Where possible all bells in a peal are cast from the same heat of metal. In molding a heavy base plate containing a conical pin in the center is used to support the bell case. The bell case of cast iron is similar in shape to the bell, and about 6 inches larger in diameter, and constitutes the flask. After the bell case, strickle pinion and strickle board are squared up, loam is plastered over the inside of the case, and strickled up to form, allowing about ⅝-inch for the finish loam coat.

Then the bell case with its loam coating is dried carefully. When dry, it is removed, the finish coat applied, and dried again. The mold is taken from the oven, and when cold is checked carefully for size. The surface is blacked with a mixture of 60 per cent charcoal, 30 per cent plumbago, and 10 per cent china clay, and sleeked to obtain a smooth finish. While the mold face is still soft, inscriptions, ornaments, etc. are stamped on with individual letters, and then the mold is dried. The interior core is made in a similar fashion, and after assembling the metal is poured in.

Use Ferroalloys

Use of Ferroalloys in Foundry (L'Emploi des Ferro-Alliages en Fonderie), by P. F. Viandon. *Bulletin* de l'Association Technique de Fonderie, Paris, September, 1936.

The author reviews the various methods of adding ferroalloys to the metal. When the alloy is added in the charge, it can be coated to protect it against oxidation. It is more usual to add the ferroalloy, and with a greater degree of precision, in the ladle.

For this purpose the ferroalloy must have a lower melting point than if it were to be added in the charge. The size of the lump must be neither too large nor too small, and it has been found that the ferroalloy should be granulated generally to a size of from 3 to 4 millimeters or about 5/32 of an inch. However, for certain types, such as ferromolybdenum, almost complete grinding to powder is necessary. Actually, the size of the grain should be studied for each alloy.

When the alloy is lighter than the metal bath, it can be inserted by special graphite boxes with holes, these boxes being held down by a refractory handle.

The effects of ferroalloys on refining the metal are discussed. They act as deoxidizers or desulphurizers: For instance, manganese acts as a desulphurizer. Alloys with aluminum, silicon, manganese, calcium, titanium, etc., as a base act as deoxidizers. A silico-titanium alloy with 20 per cent titanium reacts against oxygen, and also sulphur and phosphorus. Portevin and Lemoine have contributed to the knowledge of the effects of silico-calcium and silico-alumino-calcium, which have a strong graphitizing action; they have also shown the favorable effects obtained by adding at the same time as the alloy certain oxidizing salts, such as alkaline carbonates, permanganates or bichromates in such proportions that the available oxygen will burn the calcium and silicon in the alloy. They obtain greater graphitization, a higher temperature in the ladle, more than 50 per cent desulphurization, easily-eliminated slag and high mechanical properties for the iron.

As regards gases in solution in the iron, Lepp has shown that the effects of gases can be neutralized by a selective oxidation after the bath has been protected by a reducer in the form of the addition of a common metal or of a product of electrometallurgy.

Nonferrous

Nonferrous Foundry Problems, by F. Dunleavy, *Foundry Trade Journal*, London, England, Dec. 24, 1936.

According to the author most nonferrous foundry problems can be traced to the human element. Some of the better known defects are gassed or stewed metal; dull metal; misruns; runouts; scabs, cores lifting; blowholes from cores, and blowholes from wet sand. Misruns, runouts and cores lifting and breaking can be attributed to carelessness of molder and coremaker. Scabs are caused by insufficient venting, faulty running, hitting the pattern with a rammer, or the use of too close grained sand. Blowholes usually are due to core being rammed too hard, vents omitted or blocked up, or to cores—particularly oil-sand cores—being left in the mold overnight and absorbing moisture.

Runners, risers and pouring temperature play an important part. It is a mistake to imagine that risers remove dirt from the mold as there should be no dirt in the mold. Risers are used to feed heavy portions of castings of irregular section, and they must be in proportion to the section to be fed. Even with that precaution metal poured at too high or too low a temperature will cause defects. The question of pouring temperature always covers a wide field. Therefore, maximum and minimum temperatures should be established

(*Concluded on page* 184)

From hundreds of installations all over the country come reports like these:

OHIO

"We're getting faster melting," writes the owner of an Ohio foundry.

MISSOURI

A Missouri manufacturer of cast iron pipe reports, "Your blower makes it possible for us to get away from oxidation."

MASSACHUSETTS

"Your equipment gives us hotter iron," reports a progressive job shop in Massachusetts.

MICHIGAN

A prominent stove manufacturer in Michigan says, "Your equipment saves coke."

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(*Concluded from page* 182)

by experiment, and the castings poured within those limits depending upon the method of running.

The author also discusses centrifugally cast gear blanks and mentions that with that method an 18¾-inch diameter blank only contracts about 1/16-inch against the usual 9/32-inch contraction. Molds for the blanks are formed of dried cores with full or segment chill rings inserted. Chills are inserted hot enough to prevent cracking by the molten metal. In production work alternate chills should be used as hot chills cause porous patches near the runners. Complete chill rings are dressed with oil and plumbago while segment chills are painted with aluminum paint. Rotation of the mold is governed by the diameter of the casting, and a 6-inch blank spins at 500 revolutions per minute while a 30-inch blank turns at 90 revolutions per minute. Too high a rotational speed causes hair cracks, and too low a speed results in low tensile and brinell values. When cast, the blank must be allowed to cool which is governed by the section thickness, and which varies from 2 to 7 minutes. Then the brake is applied to stop rotation.

In discussing aluminum alloys the principles to be followed are: The sand must be rammed lightly; the sand must be rather dry, and the mold well vented; care must be taken in placing the runners and risers; care must be taken in the construction of cores, and pouring temperatures must be controlled. Since the alloys are light and a surface film of oxide is formed, they have less ability to drive air from the mold and fill sharp corners. This necessitates light ramming and well vented molds; core irons and grids must be kept well away from the mold face, and runners must be arranged to allow uniform cooling of the casting.

And Transite Core Plates not only increase production capacity . . . but provide protection against breakage, warpage and corrosion

Johns-Manville TRANSITE CORE PLATES

JM PRODUCTS

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Johns-Manville Transite Core Plates weigh only about a quarter as much as metal of equal thickness. This means that a foundry worker can handle twice as many plates in less time and with considerably less effort.

Transite's other advantages are equally important. Made of a specially treated asbestos-cement combination, these durable core plates cut down on breakage losses. Being non-metallic, they *cannot corrode* . . . they retain their smooth surface year after year. And warping is practically eliminated.

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Pattern Design

Principles of Pattern Preparation to Provide the Simplest and Most Economical Production of Castings (Grundsaetze fuer Modellanfertigung, die einfachste unde wirtschaftliche Herstellung von Gusswaren gewaehrleistet), by F. Paschke, *Die Giesserei*, Dusseldorf, Germany, March 12, 1937.

The basic condition in the manufacture of various products is their production in the cheapest way. In castings the pattern plays an important role in attaining that end. As the author points out the correct pattern preparation does not begin in the patternshop, but in the designing department. A good designer calls in the foundryman before the drawing is finished and discusses with him the various foundry angles.

The author points out various things that the foundryman should look for in the design which could be changed to facilitate molding, such as core locations, partings, etc., and with those includes sketches of various castings indicating the incorrect and correct ways of arranging the work. Types of castings include steam-jacketed kettle, diesel motor cylinder head, brake cylinder, machine base and a regulator housing.

Minerals Yearbook Appendix Issued

The United States department of the interior, bureau of mines, Washington, has published recently its separate statistical appendixes to the minerals yearbook, in bound form. Assembling these individual appendixes under one cover brings together the detailed information and tables prepared by the bureau's staff with reference to various types of minerals.

In addition 14 chapters of final statistics are included in this volume as supplementary to specific mineral commodities discussion in the 1935 yearbook. The appendix is for sale by the superintendent of documents, Washington, for $1.25.

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An independent survey of your foundry will disclose ways and means to improve working conditions - - - increase production and reduce operating costs.

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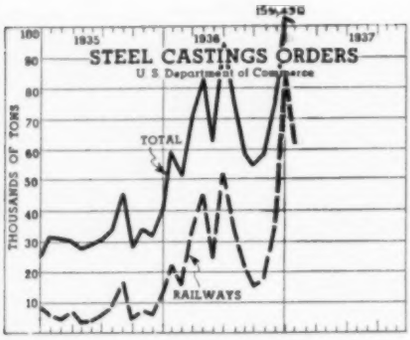
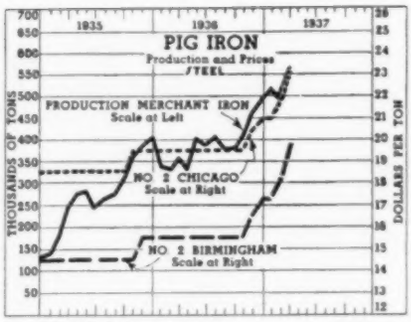
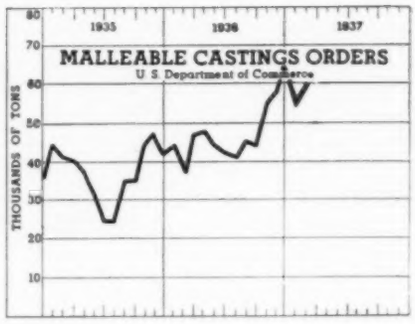






Foundry Activities

KEY CO., East St. Louis, Ill., is building a 260 x 400-foot steel foundry in that city. The plant is to be built under one roof, including material handling and storage yard. Two electric furnaces will be installed. Features of the new plant include continuous mold and core drying equipment, sand handling and distributing units. Dust prevention equipment, complete modern cleaning facilities and mechanical ventilation are to be installed. Chemical, metallographical, x-ray, physical testing and research laboratories, a pattern shop and storage facilities will be important parts of the program. The Key Co. will make its own line of oil still and oil refinery fittings and equipment, including alloy metal tube sheets and tube supports. Rated capacity of the plant is to be 200 tons per month per 8 hour shift.

* * *

Frank Foundries Corp., Moline, Ill., has installed a third electric furnace for use in melting high alloy cast iron.

* * *

Commercial Enameling & Foundry Co., Los Angeles, will build a new 71 x 115-foot factory at 130 Hampshire drive, Huntingdon park.

* * *

Fire in the plant of the Wolverine Die Casting Co., Grand Rapids, Mich., recently caused an estimated loss of $50,000.

* * *

Milwaukee Valve Co., 2375 South Burrell street, Milwaukee, is building a 2-story foundry plant, 70 x 160 feet. L. E. Peterson, 312 East Wisconsin avenue, is consulting engineer preparing plans. Valentine Fina is president.

* * *

Prudential Steel Corp., Bronx, N. Y., has been incorporated to operate a foundry. Shaine & Weinrib, 295 Madison avenue, New York, is correspondent.

* * *

Brooks Foundry & Machine Co., 521 Marietta street, Atlanta, Ga., manufacturer of gray iron castings, has awarded contract for two-story addition, 50 x 60 feet, to Hardin & Ramsey. Cost will be about $40,000, with equipment.

* * *

Muntifier Bros. Co., 4990 Relleum avenue, Cincinnati, O., is erecting a foundry building on Ralston avenue west of Spring Grove street. Cost is estimated at $8000.

* * *

General Bronze Corp., 3410 Tenth street, Long Island City, N. Y., plans to build a 100 x 105-foot plant addition on Thirty-fifth street near Queens boulevard, at a cost of $40,000.

* * *

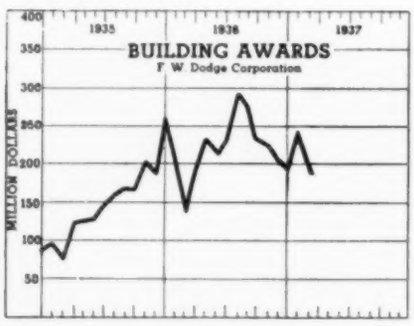
Index of foundry equipment orders, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 249.5 in February, 1937, as compared with 190.9 in January, 1937, and 110.4 in

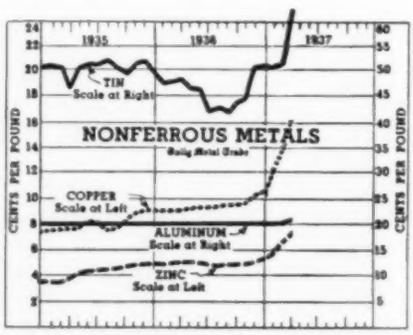
(*Concluded on page* 188)

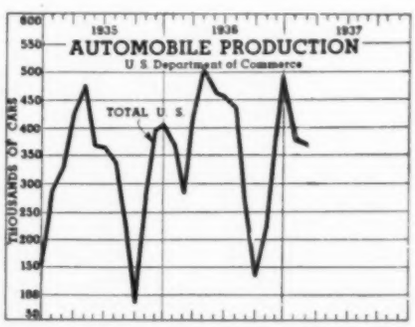
RAW MATERIAL PRICES
April 7, 1937

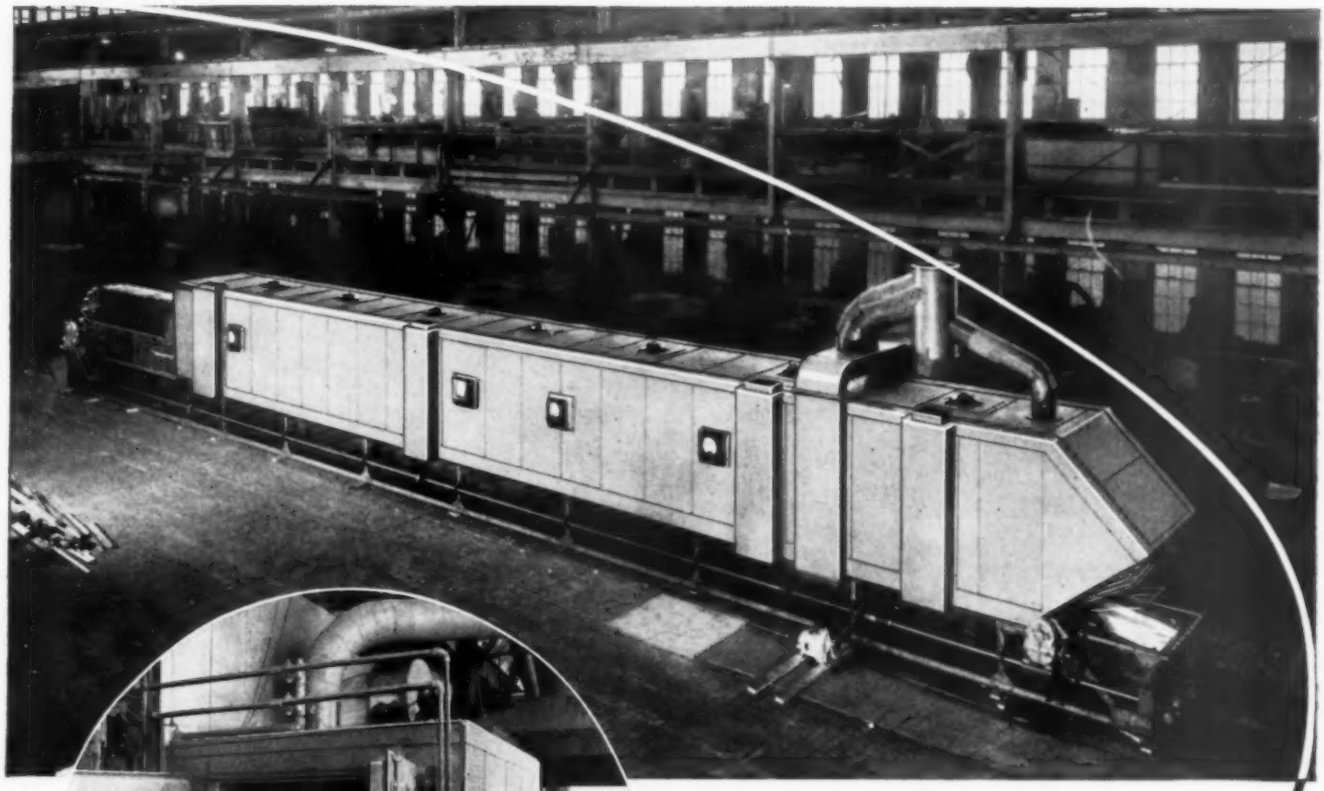
Iron	
No. 2 foundry, Valley	$24.00
No. 2 Southern Birmingham	20.38*
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	23.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$5.50
Wise county beehive coke	$ 5.00 to 6.00
Detroit by-product delivered	10.85
Scrap	
Heavy melting steel, Valley	$22.00 to $22.50
Heavy melting steel, Pitts. (dlv.)	23.00 to 23.50
Heavy melting steel, Chicago	21.50 to 22.00
Stove plate, Buffalo	15.00 to 16.00
Stove plate, Chicago	12.00 to 12.50
No. 1 cast, New York	15.75 to 16.25
No. 1 cast, mchy, Chicago	18.00 to 18.50
No. 1 cast, Pittsburgh	19.50 to 20.00
No. 1 cast, Philadelphia	22.50 to 23.00
No. 1 cast, Birmingham	14.50 to 15.00
Car wheels, iron, Pittsburgh	20.50 to 21.00
Car wheels, iron, Chicago	21.50 to 22.00
Railroad malleable, Chicago	23.50 to 24.00
Malleable, Buffalo	23.00 to 24.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	15.75
Straights tin	59.87½
Aluminum, 99 per cent	20.00 to 21.00
Aluminum, No. 12 (Secondary, standard)	18.75 to 19.25
Lead, New York	6.00
Antimony, New York	17.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	7.50

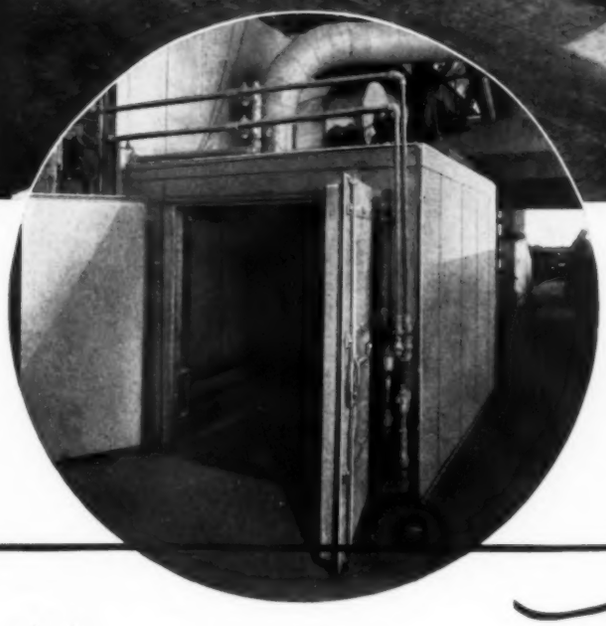
*Where phos. is 0.70 and over deduct 38c.











OVEN PRACTICE *Advances*

MUCH oven history has been made since at the Milwaukee Foundry Show, in 1918, we first exhibited our insulated steel panel oven. This previously had been developed in other fields.

The many advantages of an Engineered oven and of this type of construction soon became apparent to the Foundry Trade. Their adoption of these better ovens constantly increased, until now they are daily proving their worth in many hundreds of foundries, both large and small, in this country as well as abroad.

Our designs enable us to furnish an Engineered oven without extra cost; one which will give you the added advantages secured from an oven exactly fitted to your production and building conditions. Consult us.

Our line includes:
Shelf, lift rack, trolley, truck, car, and various conveyor types.

Heating methods utilize any desired medium, and can be of the self-contained (internal), or remote (external) types. Automatic control and safety devices are as complete as needed.

A REPRESENTATIVE IS CONVENIENT TO YOU.

YB Co

YOUNG BROTHERS COMPANY

35 YEARS EXPERIENCE BUILDING
Industrial Ovens
FOR ALL PURPOSES
6500 Mack Avenue • DETROIT, MICHIGAN

(*Concluded from page* 186)

February, 1936. Index of shipments was 201.8 in February of this year as compared with 177.2 in January, 1937, and 114.5 in February, last year.

* * *

Doehler Die Casting Co., Batavia, N. Y., has awarded the general contract for construction of a new magnesium castings building to J. E. Flierl Construction Co., 106 Kingsley street, Buffalo. Work started around April 1.

* * *

Sealed Power Corp., Muskegon, Mich., will erect a $15,000 third-story addition to its office building and is considering plans for a foundry building expansion to approximate $25,000.

* * *

Simmons Machine Tool Co., Troy road, Albany, N. Y., has purchased the plant of the Capitol District Foundry & Machine Corp., Green Island, N. Y., and is installing new equipment.

♦ ♦ ♦

Kay-Brunner Steel Products Inc., Los Angeles, recently has completed a 30 x 150 foot addition to its plant at Alhambra, Calif. The new building will house the squeezer molding department. A 90-foot addition to the cleaning room also is under construction.

* * *

Van Wert Foundry Co., Van Wert, O., has been sold to the General Implement Co. of America Inc., Cleveland. The company plans to use the foundry for the manufacture of castings to go into its line of farm implements. H. P. Collins, general manager, is located in Cleveland.

* * *

Wilson Foundry & Machine Co., Pontiac, Mich., has sold approximately 11 acres of ground to the Yellow Truck & Coach Mfg. Co. The ground lies along the west side of Saginaw street between Wilson avenue and South boulevard and includes six buildings with 300,000 square feet of floor space.

* * *

Southern Co-operative Foundry Co., Rome, Ga., has let the contract for a 2-story warehouse totaling between 25,000 and 30,000 square feet of floor space. THE FOUNDRY regrets that in the March issue the statement concerning the company's plans to build a foundry was incorrect.

* * *

Duraloy Co., Pittsburgh, which recently sustained damages by fire to its plant at New Cumberland, W. Va., has purchased a large part of the well-equipped foundry owned by the United States Pipe & Foundry Co., Scottdale, Pa. This plant includes machine and pattern shops, storeroom, testing labroatory and offices. Electric furnaces, centrifugal casting machines and other equipment which escaped damage at the old plant has been moved to Scottdale. The company is now operating on full schedule.

* * *

Strickland Foundry & Machine Works Inc., 516 West Thirty-sixth street, New York, has leased one-story building, 50 x 100 feet, at 581-83 Eleventh avenue. Company plans expansion program.

* * *

Output of gray iron castings produced in the Philadelphia Federal Reserve district increased 16.0 per cent during February, according to reports received by the industrial research department of the University of Pennsylvania. Steel foundries, however, showed a decline of 3.9 per cent in their total production. Shipments of steel castings were 34.1 per cent more in February than in the previous month and exceeded the volume of production. Deliveries of gray iron castings increased 3.6 per cent. Iron foundries during that month had a slight increase in their unfilled orders on hand, while steel plants reported a small drop.

Tells the Story!

Translated into terms of pounds of metal removed per pound of wheel wear, number of pieces or total tonnage ground per wheel—the fast-cutting action of ABRASIVE COMPANY SNAGGING WHEELS means increased production and lower costs on foundry cleaning operations.

For maximum results on swing frame, floor stand and portable grinders we suggest you investigate the application of Abrasive Company Wheels to your snagging requirements. Details gladly sent on request.

ABRASIVE COMPANY

TRADE ABRASIVE MARK REGISTERED

Tacony and Fraley Sts., Philadelphia, Pa.

We will see you at the Foundry Show — May 3-7

DIVISION OF SIMONDS SAW AND STEEL CO.

BUCKETS

Properly Designed for Foundry Service

- ☑ SINGLE LINE
- ☑ "HOOK ON"
- ☑ LOW HEAD ROOM

● Save crane time with a Blaw-Knox Foundry Type "Hook-On" Single Line Clamshell Bucket. It hooks on and off the crane hook (opening and closing being performed through the use of a single drum on the crane) and can be put in service and laid aside in a moment, releasing the crane for other duties.

Blaw-Knox Foundry Type Single Line Buckets have the low head room needed for the usual types of foundry cranes and hoisting equipment, and are a convenient tool for the quick and economical handling of moulder's sand, coal, coke, etc.

Phone, wire or write for prices, giving capacity desired—¾, 1½, 2 or 4 cu. yds.

BLAW-KNOX COMPANY
2097 FARMER'S BANK BLDG. PITTSBURGH, PA.
Offices and Representatives in Principal Cities

Visit the Blaw-Knox Exhibit at the Foundry Show Booth 98

Blaw-Knox ¾ Cu. Yd. "Hook-On" Foundry Type Clamshell Bucket.

BLAW-KNOX

New Trade Publications

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing THE FOUNDRY, in care of Readers' Service Department, 1213 West Third Street, Cleveland

PIG IRON—Woodward Iron Co. Woodward, Ala., has prepared an illustrated panoramic picture of its integrated facilities for the production of merchant pig iron. Bound in large booklet form, information and pictures give an insight to personnel, blast furnaces, mines, progress, etc. of the company. Chemical laboratories, markets and sales forces are presented. The publication is given a finished tone by an introductory statement of the policies and aims of the company, through its president, and a concluding invitation to visit its plants.

SAND CONTROL—Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has prepared information in booklet form concerning its sand rammer with moisture indicator, compression instrument, core test oven, core hardness tester, core permeability tube, and tensile core strength machine.

MEEHANITE—Fulton Foundry & Machine Co., Morgan avenue at East Seventy-fifth street, Cleveland, has issued a booklet entitled "The Story of the Development and Discovery of Meehanite."

SAFETY EQUIPMENT—Mine Safety Appliance Co., Pittsburgh, has prepared a catalog covering the general industrial field for safety equipment. The catalog is 128 pages in length and represents a comprehensive discussion of safety appliances.

MATERIALS HANDLING—A small folder on its line of materials handling equipment has been issued by the Lewis-Shepard Co., 175 Walnut street, Watertown, Mass. Lift trucks, floor trucks, barrel racks, drain stands, etc., are a few of the company's products described.

RIDDLES—Information on its electrically operated, portable riddle has been issued by the Federal Foundry Supply Co., Cleveland. A diagram points out essential parts and construction. A description of its operations and the material it will handle is included.

CIRCUIT BREAKERS—General Electric Co., Schenectady, N. Y., has prepared a booklet on its circuit breakers for office buildings and industrial uses. Their application, time-current characteristics, dimensions and types are considered.

GRINDING WHEELS—Grinding wheel specifications for grinding machines have been incorporated into a booklet produced by the Norton Co., Worcester, Mass. Standard and special shapes and types of grinding wheels are given in a simplified, clear way in the booklet.

DIAPHRAGM GAGES—Important features of a new diaphragm operated multipointer gage are presented in a recent bulletin of the Bailey Meter Co., 1050 Ivanhoe road, Cleveland. Developed by the company for boiler room service, the gage is considered in detail in the publication.

NUTS AND BOLTS—Data on its structural rib bolt dimensions, weights, and uses are given in a recent booklet of the Automatic Nut Co. Inc., Lebanon, Pa. Another booklet of the company presents information concerning a nut that automatically locks itself and stays that way until unlocked with an ordinary wrench.

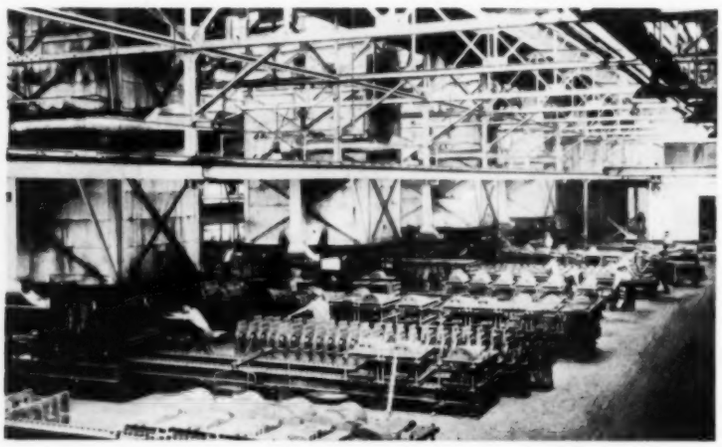
OPERATING VALVES—A catalog has been issued by the Ross Operating Valve Co., 6488 Epworth boulevard, Detroit, covering its valves for the control of single and double acting air cylinders as used on air chucks, air vises, lathes, screw machines, etc. Illustrations and blueprints give details of construction and dimensions.

MONEL METAL—International Nickel Co. Inc., 67 Wall street, New York, has issued a large illustrated booklet on the use of monel metal. In such applications as hydroelectric plants, steam generation condensing and cooling, transmission lines, etc., practicality, strength and other characteristics of the metal is pointed out.

TEMPERATURE RELAYS — Features, operation and characteristics, construction and specifications of temperature relays for protecting alternating current machines and transformers against abnormal heating is incorporated in a recent bulletin of the General Electric Co., Schenectady, N. Y. Technical and descriptive data of the company's light-sensitive cell is presented in another. Charts point out current temperature characteristics, sensitivity, illumination, etc.

DSM

Vertical Ovens



View showing a battery of the Vertical Core Ovens.

IN 1929 The Caterpillar Tractor Company installed a battery of vertical core baking ovens for processing cores ranging in size from a few ounces up to over 200 lbs. each.

They later added paste and black wash drying ovens of the vertical type.

Now, after eight years experience with that equipment they have just completed another D.S.M. vertical oven installation for processing cores up to 930 lbs. each. And completing the job in a period of 4 hrs. 35 minutes from load to unload stations.

DETROIT SHEET METAL WORKS

DETROIT - - MICHIGAN

1270 Oakman Boulevard